

STUDY ON RE-ORGANIZATION OF BUILDING AND TOWNSCAPE BY ADDING WOODEN ELEMENTS

MASTER'S THESIS 05.05.2015
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ABSTRACT OF MASTER’S THESIS

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This Master's thesis is a study about how to re-organize and to improve existing building and townscape or cityscape by way of adding wooden elements. Wood as architectural construction material has three outstanding characteristics, its light weight in comparison of strength, its thermal capacity and its variety in structural form. These characteristics indicate superiority of wooden construction in extension construction. Because, wooden construction can be built on existing structure more easily for its light weight, can be built on existing structure without cold bridge for its thermal capacity, can be built on existing structure in any structural form according to existing structure for its variety in structural form. In today's situation that cities are already full of existing buildings, to find better solution, greener and more effective solution for re-organizing existing building and cityscape to fit to new needs of city is inevitable. This Master's thesis is a case study to find such solution in way of adding wooden elements.

In the second part of the thesis, concepts of wooden extension were analyzed. The concepts were classified into four according to characteristics, those are Vertical, Horizontal, Implant and Attach. Each concept was analyzed individually with examples, and applied to the design in the fifth part of the thesis according to the analysis.

The site for the design was chosen in Rauma which is 250km north from Helsinki. Rauma has two different areas in town, the one is Old Rauma which is the area of remained old wooden buildings registered in UNESCO World Heritage in 1991, and the other is the area built with newer way. The site is on the border of the two, in newer side. In the third part of the thesis, analysis of the area and the existing building in the site was done. First, the analysis revealed that the site which is at the border of old and new area of the town is, at the same time, border of “organic and straight scape”, “small and big building scale”, “wood and concrete building material“, “commercial and cultural city function” and “border of two green spaces”. The goal of design was set to connect and buffer these differences. Secondly, the functional analysis revealed required program for the thesis site. Town planning office expected keeping existing commercial and parking function, and wished new housing and middle-scale hall for events. Music school and adult education center nearby the site has been in shortage of class rooms. As a result it was decided to design building as hybrid building of commercial, public, educational, housing and parking.

In the fifth part, in design study part, some separated wooden volumes were added to the existing structure with four extension concepts studied in the part two of the thesis, after partial demolition of existing concrete structure. The separation of volume was to connect different scale of old and new area of the town and to create spaces for walking and planting. Those separated volumes were integrated by terrace, canopy and eaves set at some levels. These eaves and the spaces under eaves work also for communication between new building and its surrounding. Different structural systems were applied for each volume to achieve different program inside. The parking volume was built with massive post and beam structure, the housing volume was built with post and beam around CLT structural cores with prefabricated wall elements, the volume for the class room and another housing was built with assembling CLT wall and slab panels, and the volume for public function was built under repetition of 1000mm height beam to realize long span of the hall space.

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Nageiredo, Sanbutu-ji temple / Tottori, Japan
photo - toriphoto.jp



Ravintola Pinella / Turku, Finland
photo - vastavalo.fi

images of wooden parasite



first sketch for the concept

1 . INTRODUCTION

I have an interest in wooden construction which exists like parasitizing something, exists in symbiotic relationship. And I have an interest in designing such situation in more modern way, in context of city.

Wood as architectural construction material has three outstanding characteristics, its light weight in comparison of strength, its thermal capacity and its variety in structural form.

Wooden construction can be built on existing structure more easily because of its light weight.
Wooden construction can be built on existing structure without cold bridge because of its thermal capacity.
Wooden construction can be built on existing structure in any form according to existing structure because of its variety in structural form.

These characteristics suggest possibilities of wooden construction in parasitizing, in extension construction. In this master's thesis I explore the possibilities.

In today's situation, cities are already full of buildings and it is inevitable to think better way, more green and more effective way to utilize existing building for changing new needs of city. This thesis also will be worthy in the sense.

In this thesis I choose a site in Rauma as case study site.

There is an area of old wooden buildings "Old Rauma", and there is an area build in newer way right next to the Old Rauma. The site is just at the border of these two area in newer side. I intended to more clarify designing extension of wood by this choice of site. The existing building in the site is not in good condition functionally and visually. The new wooden elements parasitizes this existing building to improve quality of the existing building to fit to the context.

2 . ANALYSIS OF WOODEN EXTENSION CONCEPTS

2. 1 Four concepts of wooden extension

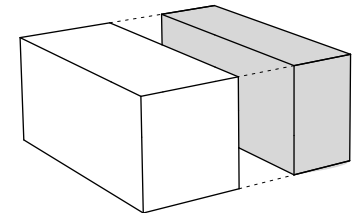
- 2. 1. 1 Example - Horizontal
- 2. 1. 2 Example - Vertical
- 2. 1. 3 Example - Implantation
- 2. 1. 4 Example - Attach

2 . 1 Four concepts of wooden extension

Construction of extension can be classified into four concepts according to how the new part is added to, parasitizes existing construction. In this section each concepts are analyzed with examples.

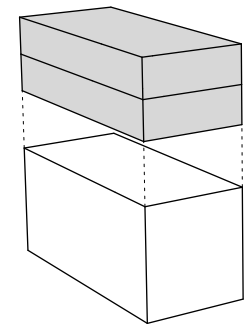
HORIZONTAL

Horizontal extension is added next to existing construction. This way needs empty space next to existing construction and built with new foundation. For this reason, new structure can take less restriction from existing structure (span, order, etc..). If existing structure have enough stability horizontally, new structure can be built with less structure for horizontal stability by leaning on existing structure.



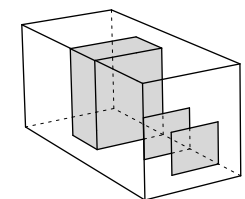
VERTICAL

Vertical extension is added on existing construction. Because of the reason, new structure is much affected by existing structure (span, order, etc..). Generally and originally wooden construction is built with shorter span than construction of other material like concrete and steel, however nowadays this problem has been being solved by appearance of engineered wood (CLT, LVL, Glulam, etc..). In that sense this extension way includes the most today's possibility.



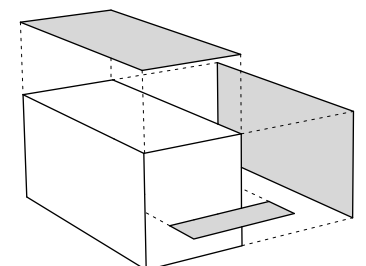
IMPLANT

Implant is constructed inside of existing structure. The biggest difference from **Horizontal** and **Vertical** is that this construction does not support any floor and roof, that is, this extension does not have primal structure. Mainly implant construction is added to make new separation or interior inside existing structure. Good transportability and workability of wood helps this way much because the construction has to be done inside and under existing structure.

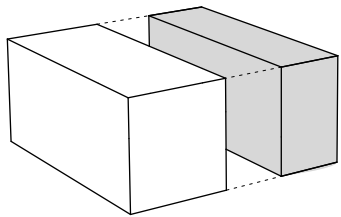


ATTACH

Attach is added on and around existing structure. This extension construction also does not have primal structure. Attach is mainly taken to improve building property against exterior environment or visual value of existing building. Light weight and good thermal property of wood are featured in this way.



2 . 1 . 1 Example - HORIZONTAL



Project : Center for Agricultural Education
Architect : Fink Thurnher Architekten
Site : Altmünster, Austria

The vocational school for the Salzkammergut region of Austria, in this example, wooden new part was added to L-shaped existing building built in 1950s. Originally the existing building had U-shape but reduced east wing as it was not possible to integrate it structurally into the new usage. The building shapes central courtyard and four wings by containing existing building with wooden extension.

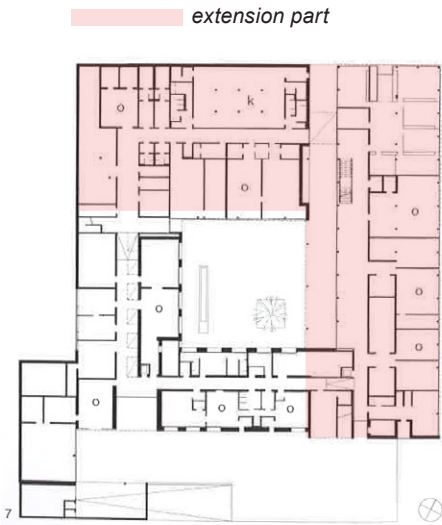
Remained original building has cluster of small boarding rooms, on the other hand new part has bigger spaces like classrooms, foyer and library and so on. The Contrast is shown on facade as well, original building was newly plastered, new part was covered with silver fir on the other hand.

The expression of showing contrast between new and old with showing integration (completion of courtyard style) at the same time must be one of the ideal goal of extension.

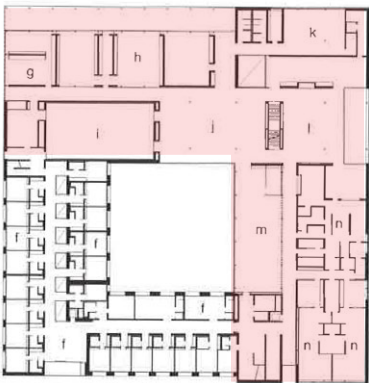
Despite its timber exterior, the building is not full timber building. Laminated timber slabs were used between steel beams, solid timber walls were used for stiffening between steel pillars, facades were prefabricated as timber frame elements which are insulated with cellulose.



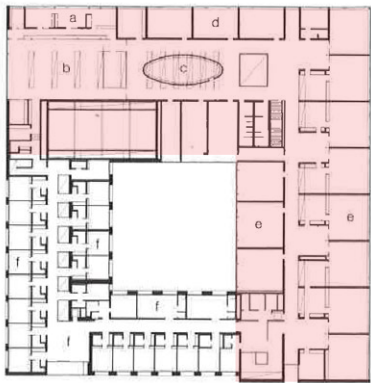
photo : architektur.mapolismagazin.com



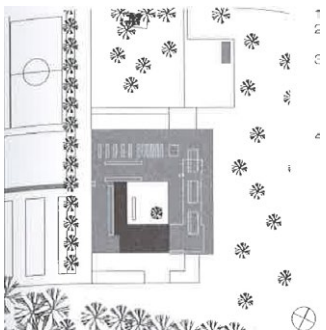
plan B1
10



plan 1F



plan 2F



Project : Visitor Center Caerphilly Castle
Architect : Davies Sutton Architects
Site : Caerphilly , Wales

The building locates within the Outer Ward of Caerphilly castle which is the earliest example of the true regular concentric fortification, the so-called Edwardian style, in the British Isles. The visitor center was built for the very large number of visitors to the site.

As seen in section drawings below, the building is designed with less contact to the ground and historical wall to avoid giving damage. This was possible by choosing light-weight material “wood”.

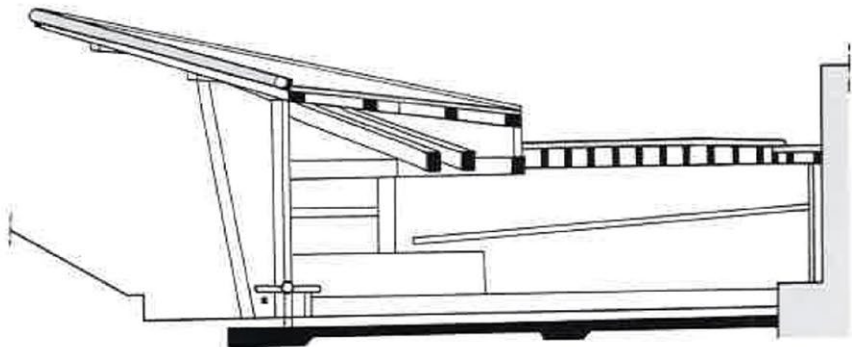
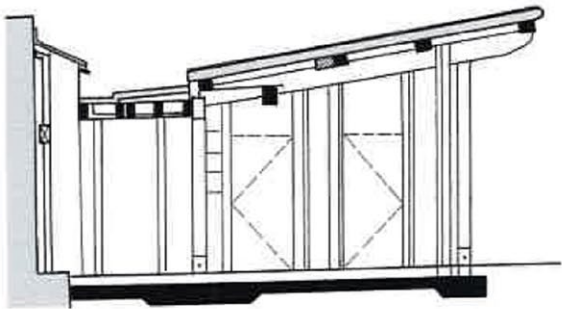
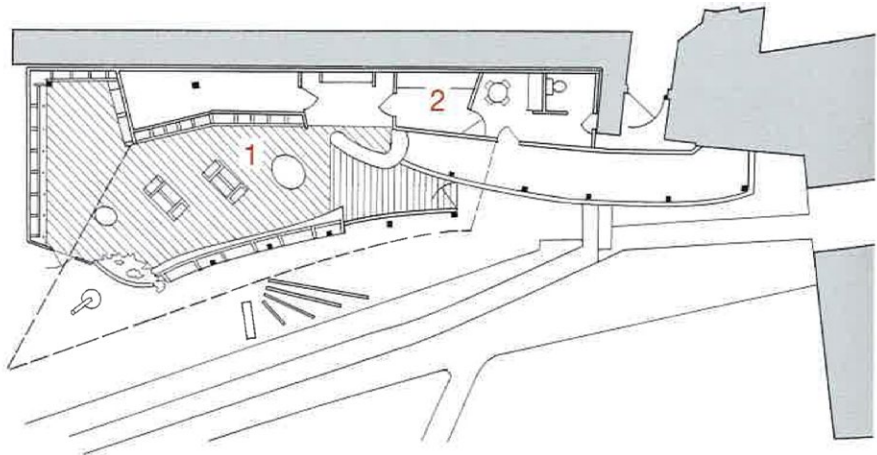
Material as wood makes contrast in visual expression as well as the contrast in physical weight between stone and wood. The flying roof by post-and-beam structure of oak gives different rhythm against rigid stone wall. The architect himself says “ the new building attacking the old..... the proposed materials and form of the building ensure it is clearly a building of its time, but one that enhances and compliments its surroundings”.



photo : davies-sutton.co.uk

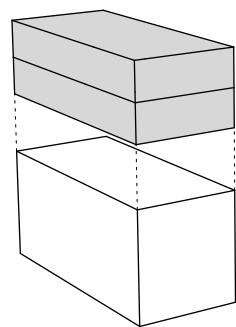


photo / coflein.gov.uk



drawings and photos without mention : Old Buildings Looking for New Use / Pierre Thiebaut

2 . 1 . 2 Example - VERTICAL



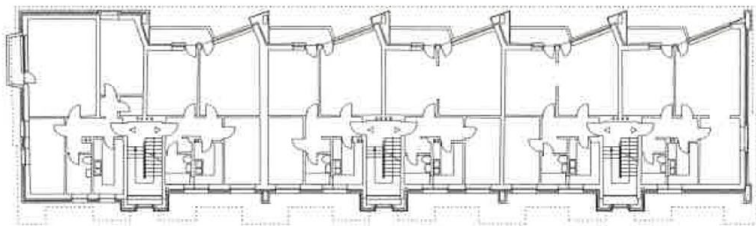
Project : Treehouse Bebelalee
Architect : Blauroom architekten
Site : Hamburg, Germany

The housing estate on Bebelallee was built in 1959, five two-storey apartment rows run south-west to north-east and three-storey set perpendicular to them. The aim of the densification feasibility study carried out in 2006 was to double the living space while reducing by half the carbon dioxide emissions. A solution for this was to add two-storey in timber construction. And 47 new flats have been added on top of existing building. The facades of existing building were given new layer for better insulation and it was necessary to underpin parts of existing strip foundation.

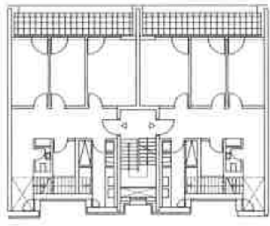
The added storeys were built with hybrid construction technique: the stairwells and the walls separating apartments are made of concrete and brick, while prefabricated timber elements were used for the remaining walls, facades and ceilings. Wood can be found in the shingled facade of untreated Alaskan cedar.

The new part and existing part were given different materials on facade, but, because of applying same size to both materials, two parts have communication.

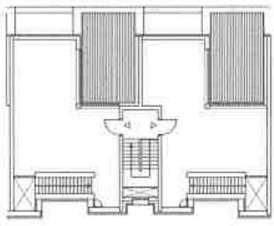
Refurbishing of housing built after war is today's task. This project is one of the exemplary model.



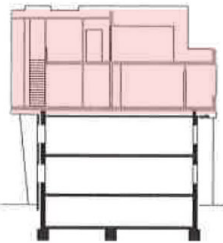
1F plan



4F plan



5F plan



extension part

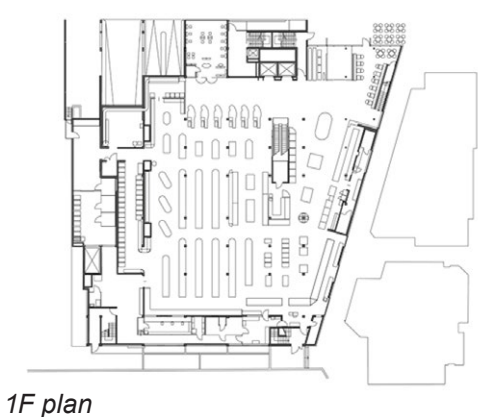
Project : Aufstockung Sutterlüty Citypark
Architect : Hermann Kaufmann architekten
Site : Vorarlberg, Austria

The project of atrium house on the existing “Sutterlüty Citypark” department store which has existed in the city center of Drnbirn since 1983. As part of the total renovation, the maximum structurally permissible addition - 4th and 5th floor - was added on the existing structure.

The new part added with timber structure holds 21 apartments and 2 offices around glass-roofed courtyard. All apartments have living room oriented towards outside with terrace and inside-facing bedrooms receive light through courtyard atrium.

All walls of the atrium, the load bearing partitions on the 5th floor and roof structure are made of prefabricated timber elements. For the reason of fire protection, the floor plates are made of mineral-based building materials.

On the contrary to the previous work “Treehouse Bebelalee”, this project added different function on existing structure. Such situation makes difficulties in structural span and placement of partitions often. In this project such problem is solved by making fascinating big atrium space at the center.



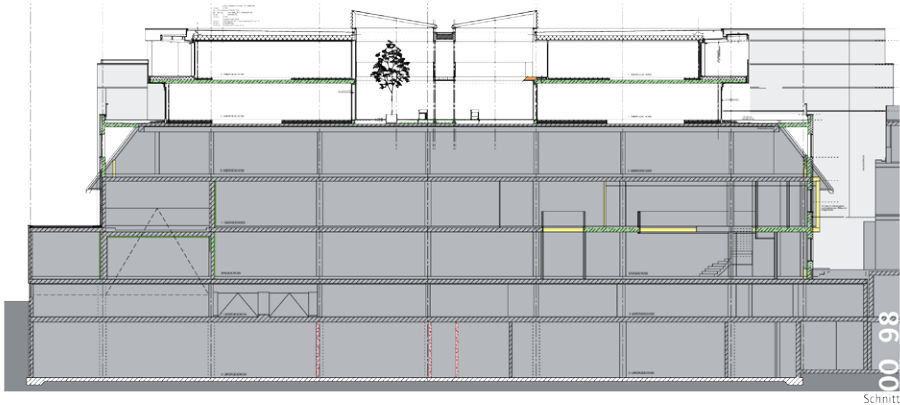
1F plan



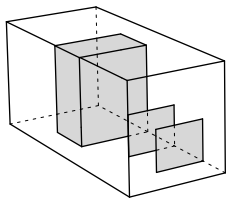
4F plan



5F plan



2.1.3 Example - IMPLANT

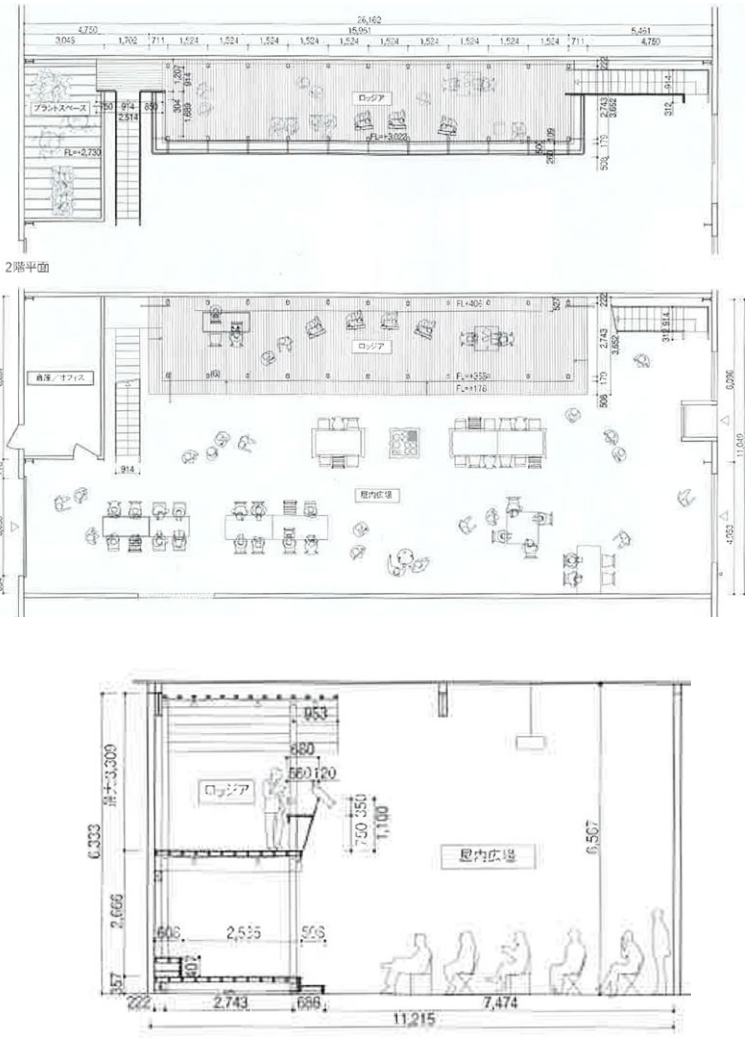


Project : AGORA
Architect : ATELIER BOW WOW
Site : Honolulu, Hawai, US

Project of public space built in a warehouse in Kaka’ako area in Hawai. Kaka’ako area is a so-called “warehouse area” because it locates nearby port even though it is close to the central area Honolulu. Artists, galleries, cafes, design offices have been gathering to this area recently and space for generating sense of community was needed to be built. Architect had an idea to built a “normal” building outside first, but ended to the idea to built a light-structure inside a warehouse for the reason of low budget.

The two-storey agora built in one-third area of the warehouse can be used as space for audience as well as space for player. The extension succeeded in bringing new dimension to the space by adding level of second floor. The simple appearance of agora with minimum elements synchronizes to the appearance of warehouse, at the same time it is appealing itself strong.

The sense of temporariness (regardless of building is really temporary or not) is one of characteristics of wooden construction and specially in the way of Implant. The project shows good example of it.



photos : ourkakaako.com

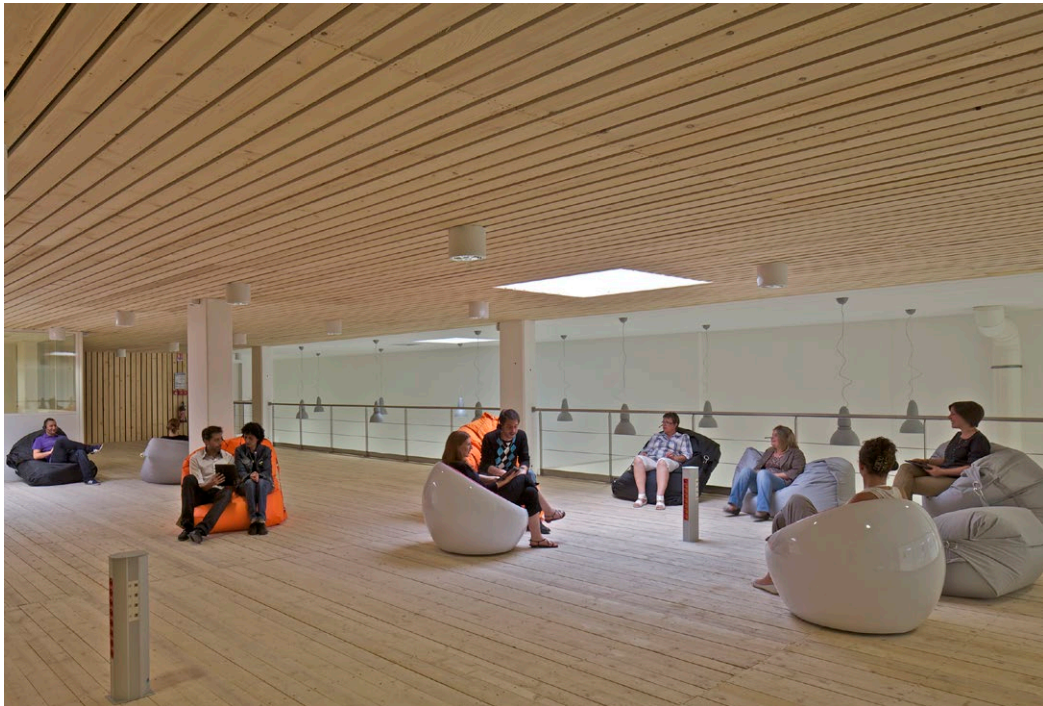
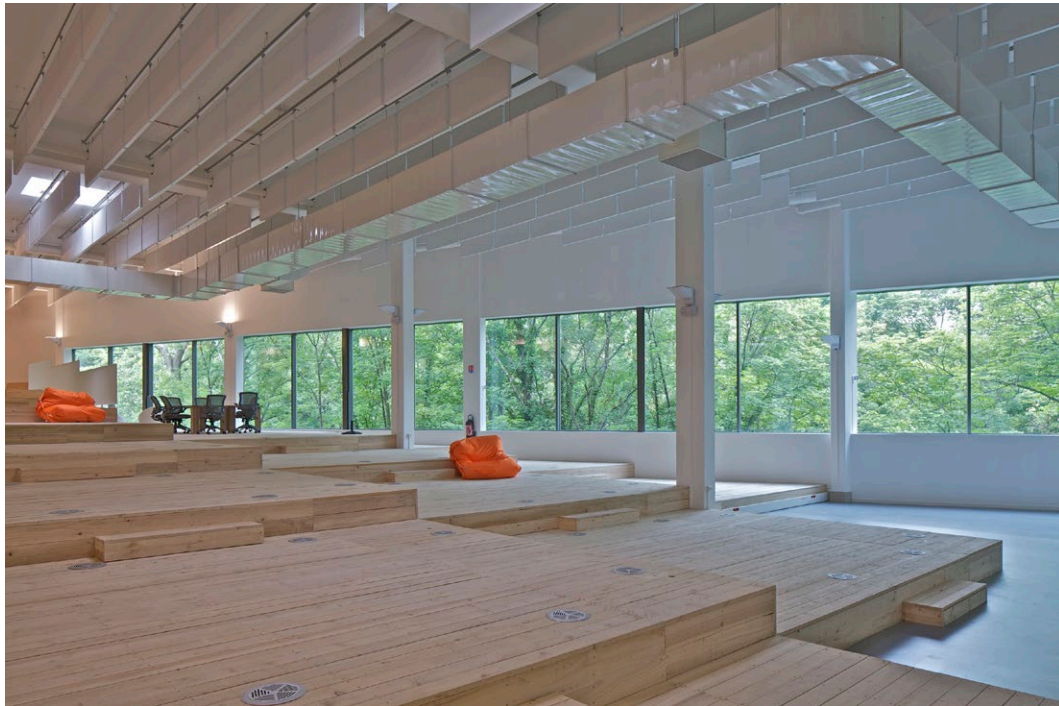
Project : TELETECH CALL CENTER
Architect : MVRDV
Site : Dijon, France

Transformation of a disused Dijon Mustard laboratory into a call center. Completion of the 6500 square meter refurbishment into a works paces for 600 operators of Teletech has cost only 4 million euro by leaving intact the maximum amount of existing structure and services.

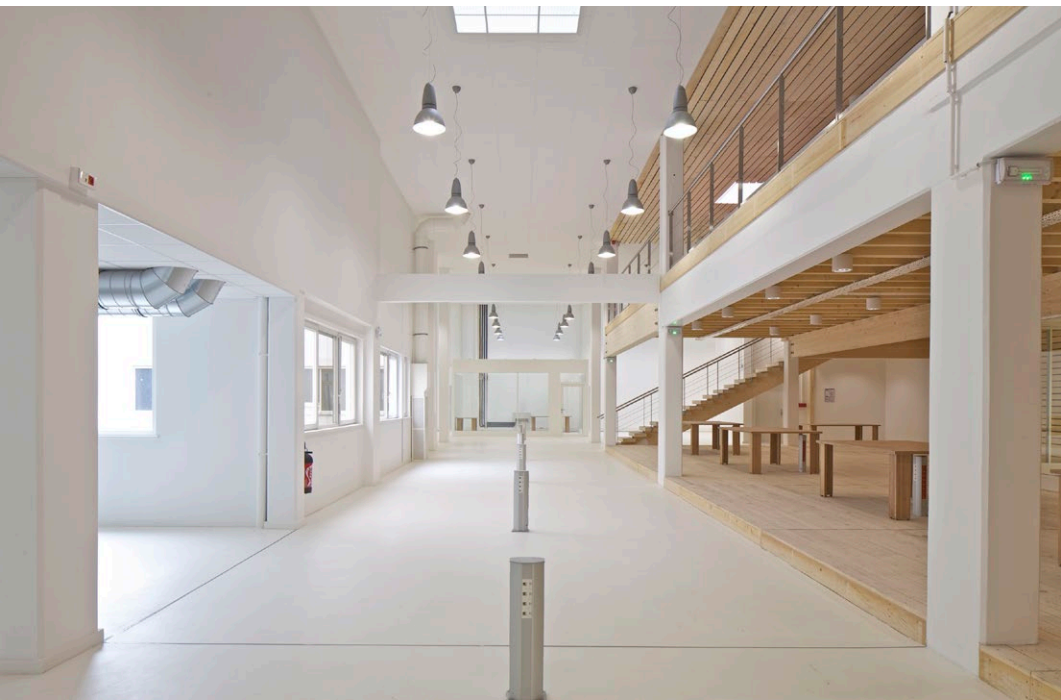
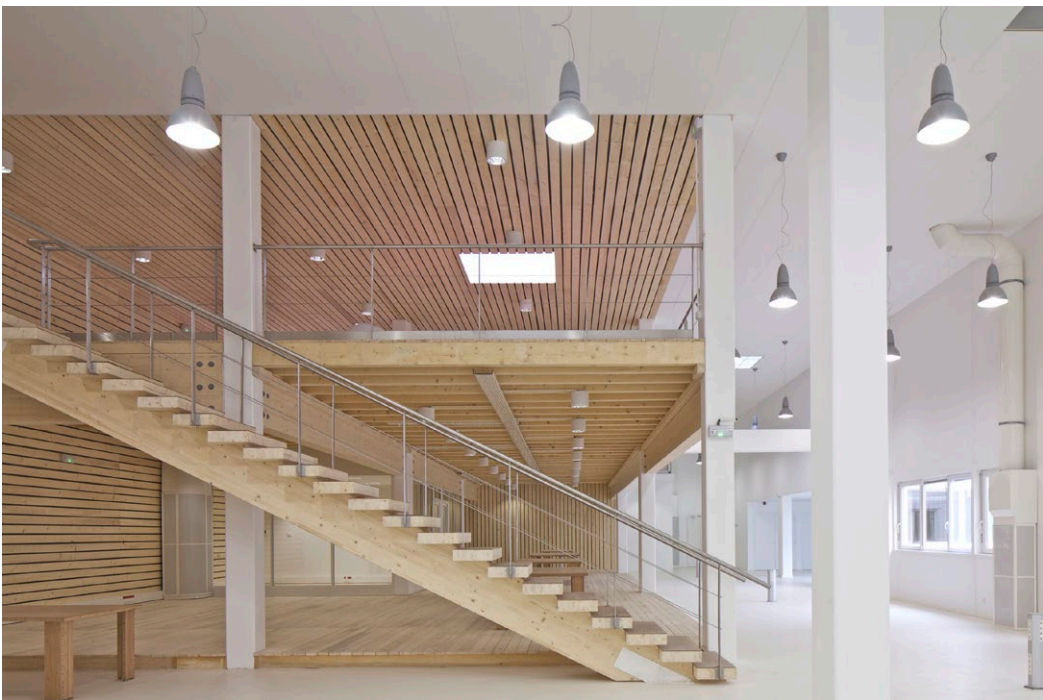
Teletech center has rush-hour in the morning, afternoon and early evening, only at three moments the building is fully occupied by its workforce. For these short periods also unusual work places can be used which would not be suitable for eight hour shifts. The transformation strategy is adapted to this irregular use of the building and offering flexible spaces: silent, open or secluded places to operators.

Architect implanted wooden elements between existing structures for the transformation. White painted existing part and added wooden part are separated visually intentionally. The emphasized soft feeling of wood between whites gives more relaxing feeling.

The project shows an example for how to reuse a building which is structurally in good condition but not suitable for a traditional transformation and use.
And shows an example for the aim of this thesis directly.

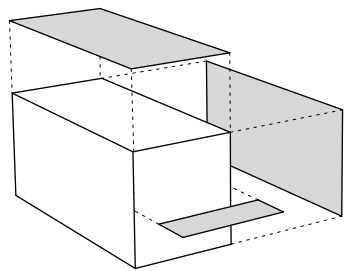


photos : dropbox.com/sh/qzzna3uciu9xwh8/QuE_fkfWAK#/



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2.1.4 Example - ATTACH

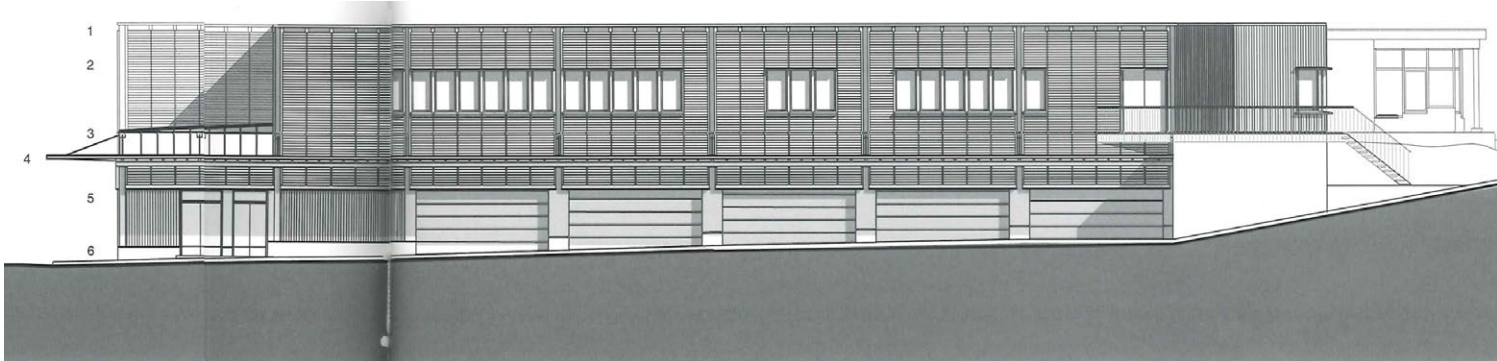
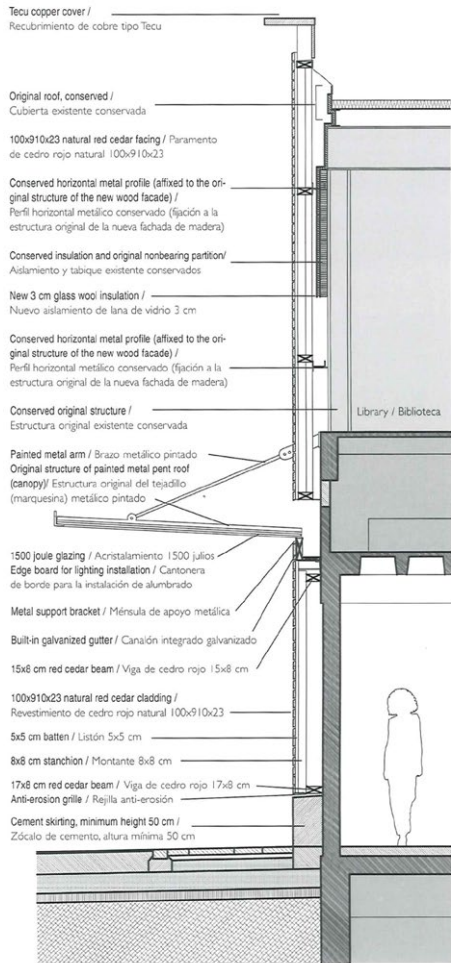


Project : rénovation de l'ancien marché couvert
Architect : ADH doazan + hishberger&associates
Site : Lagny - sur - Marne, France

Rehabilitation of a building which has market on first floor and library on second floor. Since the market was to be undergoing reforms, the opportunity presented itself to give whole volume a treatment.

The program included changing the cladding on second floor for a new facade of untreated red cedar. Wood was chosen because it is lightweight, durable and easy to affix to the building. These prefabricated facade panels shield the building from water and wind.

The first floor facade consists of fiber glass doors which run from pillar to pillar. The two floors are divided along the facade by an armor-plate glass canopy, which enables the stalls to be extended to the edge of the built space.

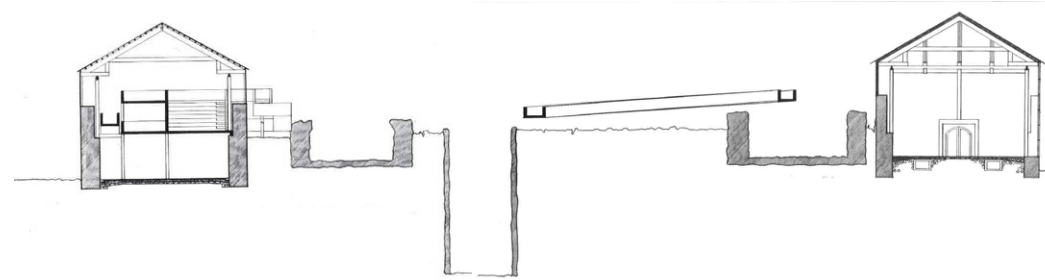


Project : Hedmark Museum
Architect : Sverre Fehn
Site : Hamar, Norway

Project of protection on mediaeval ruins with wood, glass and concrete.

Architect covered the ruins to protect them from outside environment with roof of wooden structure. Although glasses are put between roof and existing stone wall, inside and outside are air-free. In such condition the feeling of “attached covering” is more emphasized.

The roof is supported by wooden pillars which is set directly on existing wall to be protected. This is the possible way only with lightweight material wood.



drawing and photo : Sverre Fehn / Samlede Arbeider



photo : ARCHITECT SVERRE FEHN INTUITION - REFLECTION - CONSTRUCTION

/ THE NATIONAL MUSEUM

Project : One Niseko
Architect : Kengo Kuma and associates
Site : Hokkaido, Japan

Renovation of a hotel in famous ski resort Niesko, Hokkaido. The project includes interior renovation and addition of roofing of wood.

The addition of roofing of wood is the point of focus. As well as adding protection of visitors from rain and snow, the roof with wooden stripes works for visually integrating scattered volumes of existing building.



photos : flickr.com/photos/kenlee2010/11946870875/in/photostream/

3 : ANALYSIS OF SITE

- 3. 1 Introduction of Rauma
- 3. 2 Transition of city shape
- 3. 3 Current situation of project area
- 3. 4 Current situation of project site and existing building
- 3. 5 New town plan and previous proposals for project site
- 3. 6 Functional analysis

3. 1 Introduction of Rauma

Rauma is a municipality in western Finland's Satakunta region. Rauma locates on west coast of Finland, 250km north from Helsinki, 90km north from Turku. With 40,000 inhabitants, Rauma is well know for its colorful regional dialect, its long tradition in bobbin lace-making and well preserved old wooden building area which is know as Old Rauma.

Rauma is the fifth largest port in Finland, with its excellent harbour facilities and easily navigable rivers Rauma grown from a small village to an industrial city. Rauma received its privileges on 17th April 1442. It was the fifth town in Finland after Turku, Porvoo, Ulvila and Viipuri. The main industries have been shipbuilding, paper and pulp mills, metal industry.

Rauma is a town with two UNESCO World Heritage sites. The one is Old Rauma listed in 1991, and the other is the burial site of Sammalahdenmäki listed in 1999 as the first archaeological site in Finland.

Old Rauma is an excellent example of an old Nordic wooden town covering 30 hectares. It contains 600 buildings, both dwelling and shops. There are approximately 800 inhabitants in the area.

Annual Lace Week has been held since 1971. The Lace Week is an event of music, dance, traditional cooking and lace. Historical sources reveal that bobbin lace-making in Rauma goes back all the way to the 1740s. In the beginning ,The Lace Week was a set of exhibitions during which skilled bobbin lace-makers could display their works, but it has developed into a wide-ranging communal event. The Lace week culminates to the Black Lace Night, when the small boutiques are open late night, various shows and concerts are held and people dress in black lace.



one of main street in Old Rauma, the area is used both for shop and dwelling
photo : facebook.com/Pitsiviikko/



Rauma lace and Lace Week
photo / facebook.com/Pitsiviikko/



Sammalahdenmäki
photo / wikipedia.org



view of UPM factory at coast
photo : upm.com



view from Old Rauma to city center
photo : wikipedia.org



photo : google.com



photo : opaskartta.rauma.fi

3. 2 Transition of town shape

Rauma received its town charter in 1442. The town structure is still partly based on the mediaeval crossroads system, though the only remains of mediaeval Rauma today are the ruins of the late-14th century church of the Holy Trinity and the early-15th century church of the Holy Cross.

The left oldest map is from 1650 by *Hannu Hannunpoika*. In the map it is drawn that a road from inland separates into three in the town and goes down to the harbour. The central one of the three is today's Kauppakatu. It is reckoned that the oldest area of settlement was in the vicinity of the Holy Trinity church and the fish market, which is where the shoreline was in the 14th century as the land rose and the coast receded, people setteled alongside the road leading to the harbour.

The 16th century

The population of Rauma in the late of the century is estimated at more than 500 and the number of households at about 100. In the century Rauma was destroyed by fire three times.

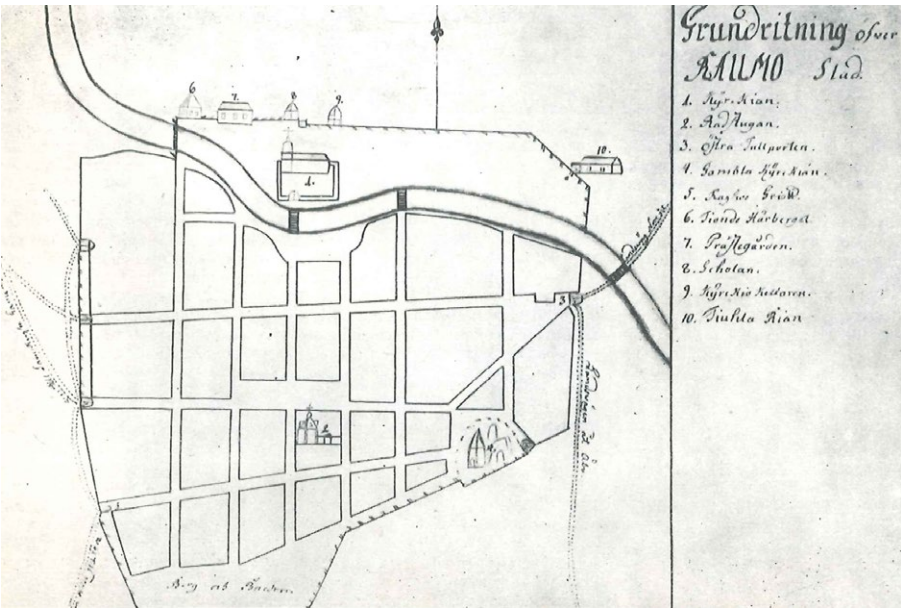
The 17th century

In the century the harbour was moved further away from the town as continuous land rise. The trading center in the town was moved to the current market square from the vicinity of the Holy Trinity church.

In the 1620s, the customs fence built around the town for collecting patty duties. As its erection and maintenance was the responsibility of the town burgesses, they made sure that the town building area to be enclosed and not to expand unnecessarily. The enclosed area by the fence is the area called “Old Rauma” today.

After the fire in 1640 which destroyed the church and the surrounding buildings, interest in finding new building land in west happened. At the same timing of it, in 1641, in the Finnish province of Sweden, it was decided that a regular town plan had to be immediately approved of for all new towns. The new regular town plan was applied in Rauma by straightening roads and plot boundaries.

The population in 1675 was probably exceeded 900 residents. In 1682 the town was completely consumed by fire.



map from 1650 by Hannu Hannunpoika
picture : Vanha Rauma Old Rauma / RAUMANMUSEO 1992

The 18th century

From the 1713 to1721 Finland was ravaged by the Great Wrath war. During this time about 42 houses in Rauma were abandoned and another 82 decayed. When inhabitants eventually returned, there were only 30 houses fit to live in. Plenty of vacant lots gradually became occupied and by the end of the century there were over 250 houses and about 900 inhabitants were paying land tax in 1785 (there were only 200 in 1722) .

In 1776, the Rauma town hall which is museum now was built at next to the market square.

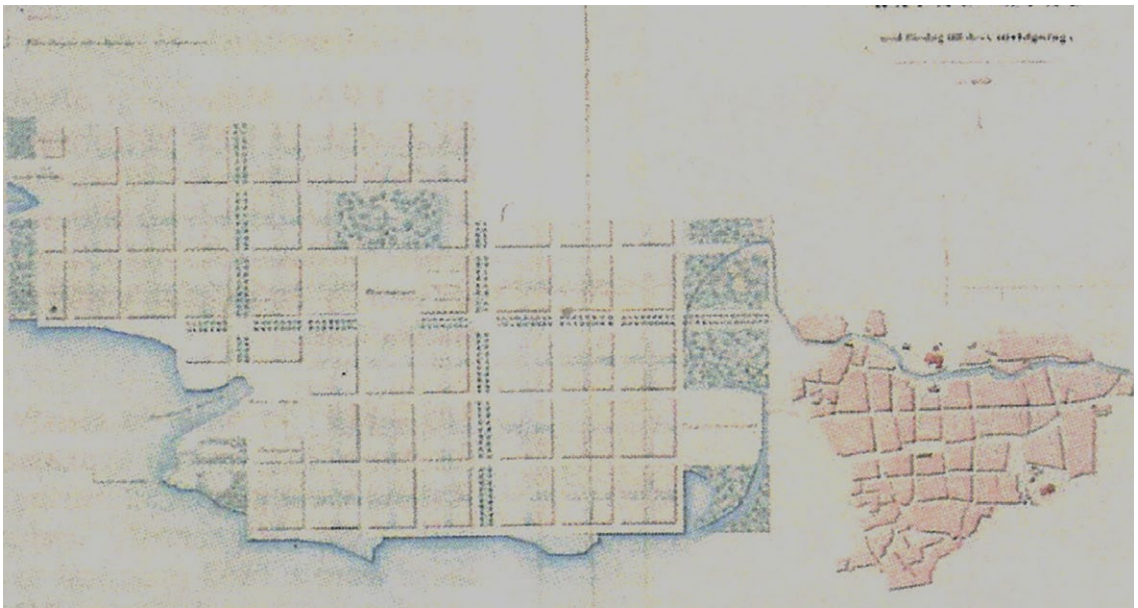
The 19th century

In the century, the influence of the German architect C.L.Engel, who designed the center of Helsinki around Senate Square and new town plan for Turku extended far beyond the whole country.

Efforts to improve the town plan for Rauma in the 19th century were consequent to a pressure for more plots following an increase of population. In 1808 the petty customs levy was abolished and the custom gates removed. The bias was thus laid for an expansion of building area. In 1836 the magistrates began to survey and chart the town lands. The results revealed that the building area was still much the same as the customs area disbanded about thirty years before. The only additional plots were west of the vicarage on the north side of the river and near the south border of the town.

In 1850, Carl Ceder draw new town plan proposal. The proposal had a strictly stereotyped grid basis. The revision remained unexecuted because of the sever opposition. And the same happened on the proposal by the country architect Chiewitz. As the town population steadily increased, the housing problem became annually more sever , but it was understandable that the burgesses of Rauma would not agree to the plan which rejects things which exist already.

By 1863 a town plan for the new part in the west of the town had been drawn up by the surveyor Henrik Wahlroos, and it was approve in 1865.



proposal for the new part of the town by Henrik Wahlroos in 1863
picture : Suomalainen puukaupunki / Henrik Lilius

In 1895, town council called for proposal for the old town, because the plots in new section were not sold many, so the question of old town was still critical. The civil engineer Emil Sonck was invited to design the plan but the result was not satisfactory again.

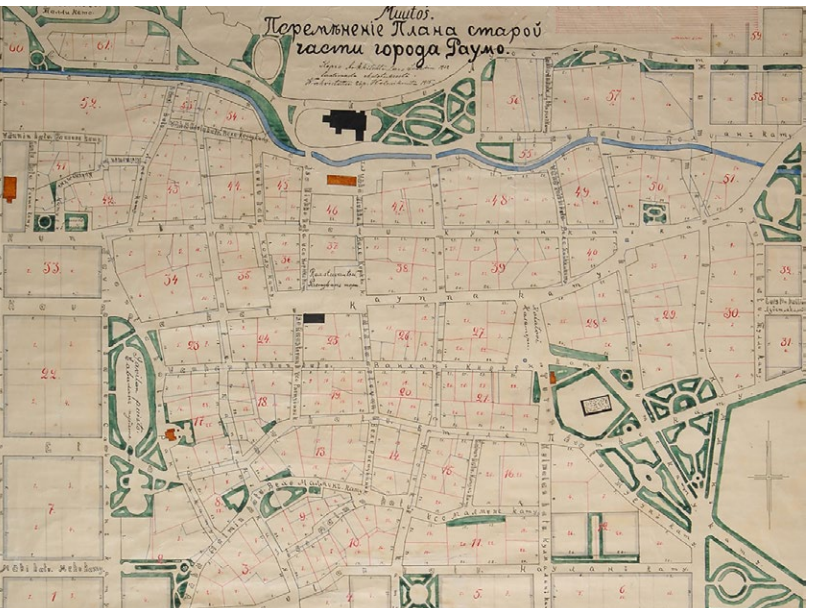
The information on this page is mainly from the book :
Vanha Rauma Old Rauma / RAUMANMUSEO 1992



low buildings and its townscape in 18th century
picture : Vanha Rauma Old Rauma / RAUMANMUSEO 1992



Rauma town Hall built in1776 next to the market square
picture : Suomalaisia puukaupunkeja / Elisa El Harouny



proposal for the old town by Emil Sonck in 1895

Sequence of transition of town shape

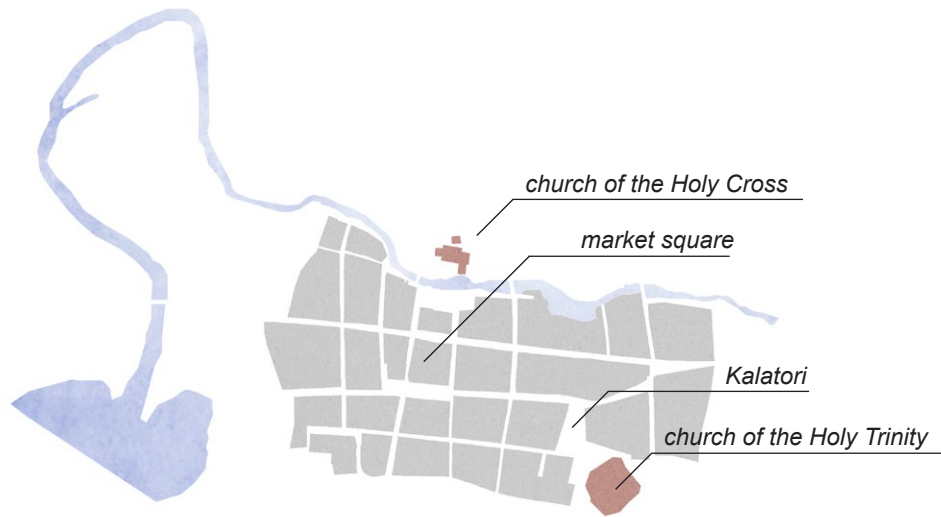
In the 17th century, the outline of today’s Old Rauma can be seen, and the area was enclosed by custom fence.

In 1841, the fence had been removed already for the expansion of town area, however the only additional plots were west of the vicarage on the north side of the river and near the south border of the town.

In 1940, the town spread dramatically to the south and the west. Those new plots are larger and more straight in comparison with those in the old town. The shape of the canal also had been changed.

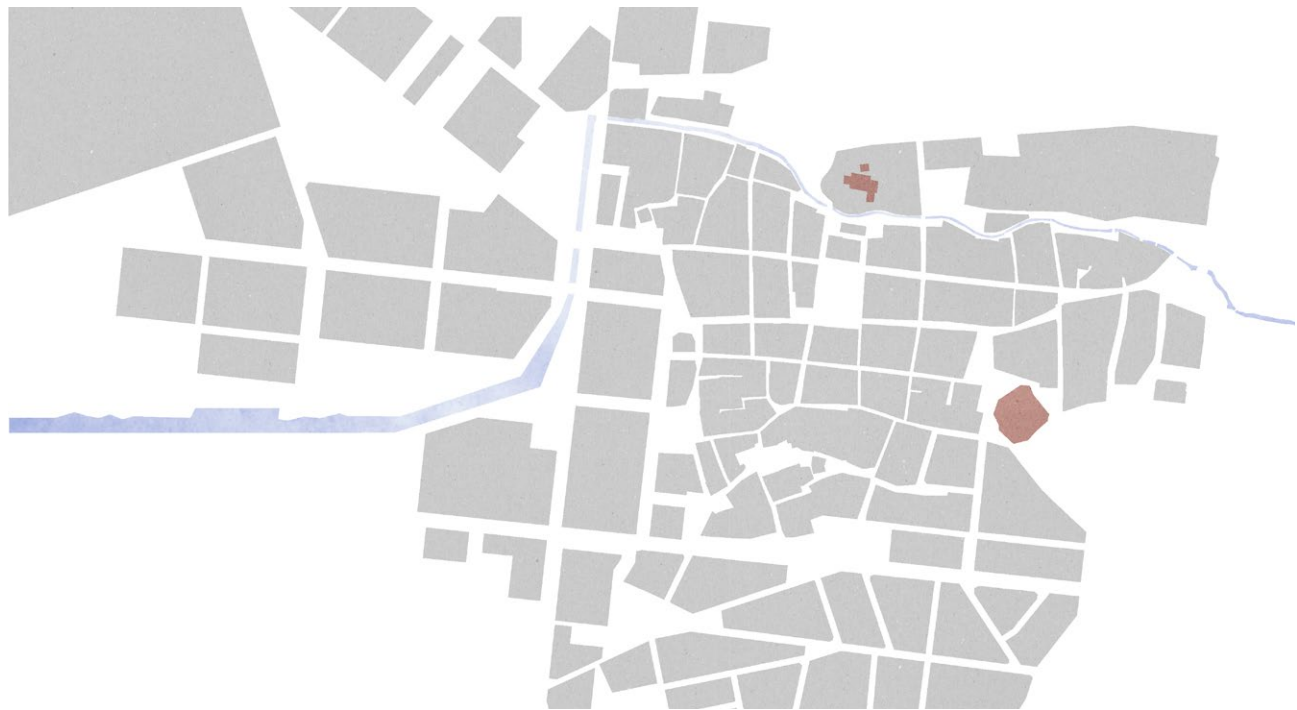
In 2011, the town spread with even bigger scale to the more west. At the same time groups of straight - aligned small single houses appeared with big plots in the east side.

The project site of the diploma locates at the boundary of the new and old part of the town. The difference of new and old means also the difference in shape of plot (straight - organic), in scale of building (big -small) and in material of building (concrete and wood).



late 17th century

1841



1940



2011

Site analysis map



3. 3 Current situation of project site

Project site situates in a plot surrounded with Nortamonkatu, Savilankatu, Kauppakatu and Pakkahuoneenkatu. Old Rauma area with wooden small buildings spreads on east side and new part with buildings built with modern way spreads on west side. It can be clearly seen that the site is on the border of small and big scale, wood and concrete, organic and rectangular form.

Canal and Nortamonkatu running west side of the site make first axis of the area, and crossing Kuninkaankatu which goes through new and old part of Rauma makes second axis.

In current situation most of all the roads even in Old Rauma is used as car traffic not only for pedestrian. But the area marked with translucent red is targeted to be improved as more pedestrian way in town planning [*KANALIN LÄNSIR-ANNAN ASEMAKAAVAN MUUTOS LUONNOS 14,03,2013*].

In the plan, 20,400 kem2 new shopping center, new bus center and 30,110 kem2 new housing block is under planning at the corner of Nortamonkatu and Kuninkaankatu by town planning office (primary design was by competition winning entry by JKMM Architcts).

Thus, It is possible to say that the two main axes of the town will be more important in the future and the plot of this diploma project site is expected to contribute to the plan; enforce of pedestrian connection and functioning as commercial space.

Today's situation of the project site is far from such contribution. Existing building facades of the all sides are closed even on Kauppakatu and Savilankatu, except for an entrance at the corner. The new project in this site should be more open to the streets and people.

Plus that, It would be important to concern about connection between Old Rauma and Kaija park (in both way, pedestrian and green), and difference in building scale and material and form between Old and New part of town as mentioned above.



typical street of Old Rauma



photo : raineytisdale.files.wordpress.com



A) Church of the Holy Cross
photo : atravelbook.com



B) Old town hall
photo : coldcoldercoldest.fi



C) Ruins of the Church of the Holy
photo : wikipedia.org



D) City hall
photo : a-konsultit.fi



E) Auditorium Poselli
photo : marianseurakunta.fi



F) City library
photo : ark-l-m.fi



G) Path along the Rauma river



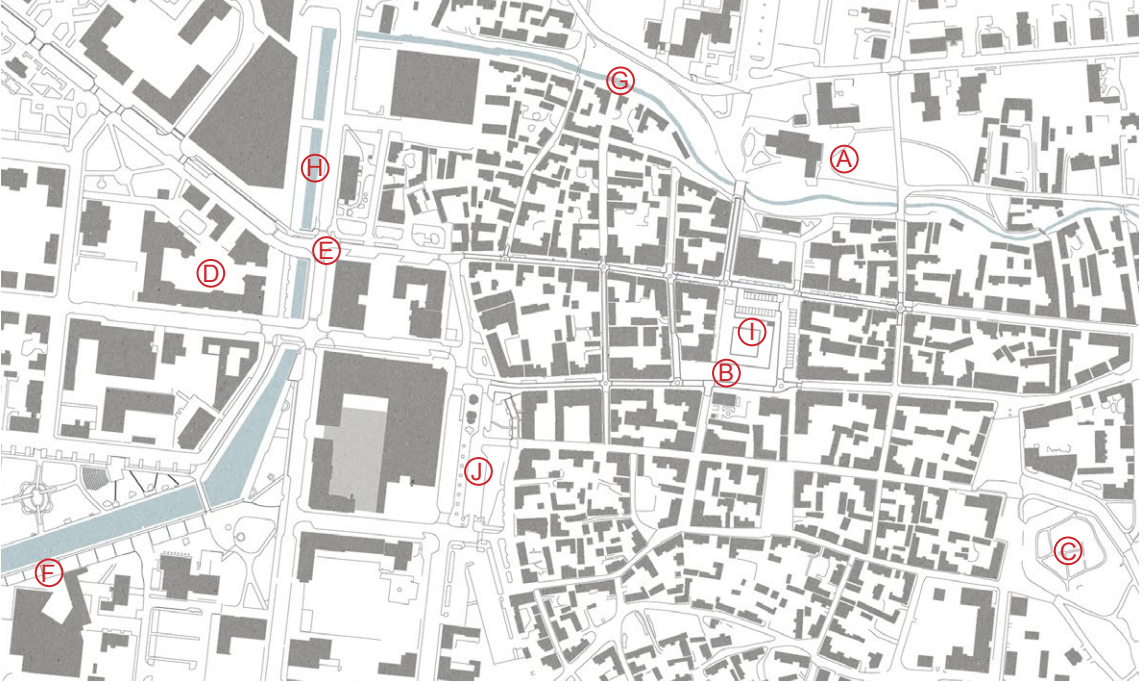
H) Canal
photo : flicker.com/photos/mattimattila/



I) Market square
photo : pambilger.blogspot.fi



J) Lace Week stage in front of the project site
photo : facebook.com/Pitsiviikko/





1.



2.



3.



7.



8.



9.



11.



12.



13.



4.



5.



6.



10.



14.



15.



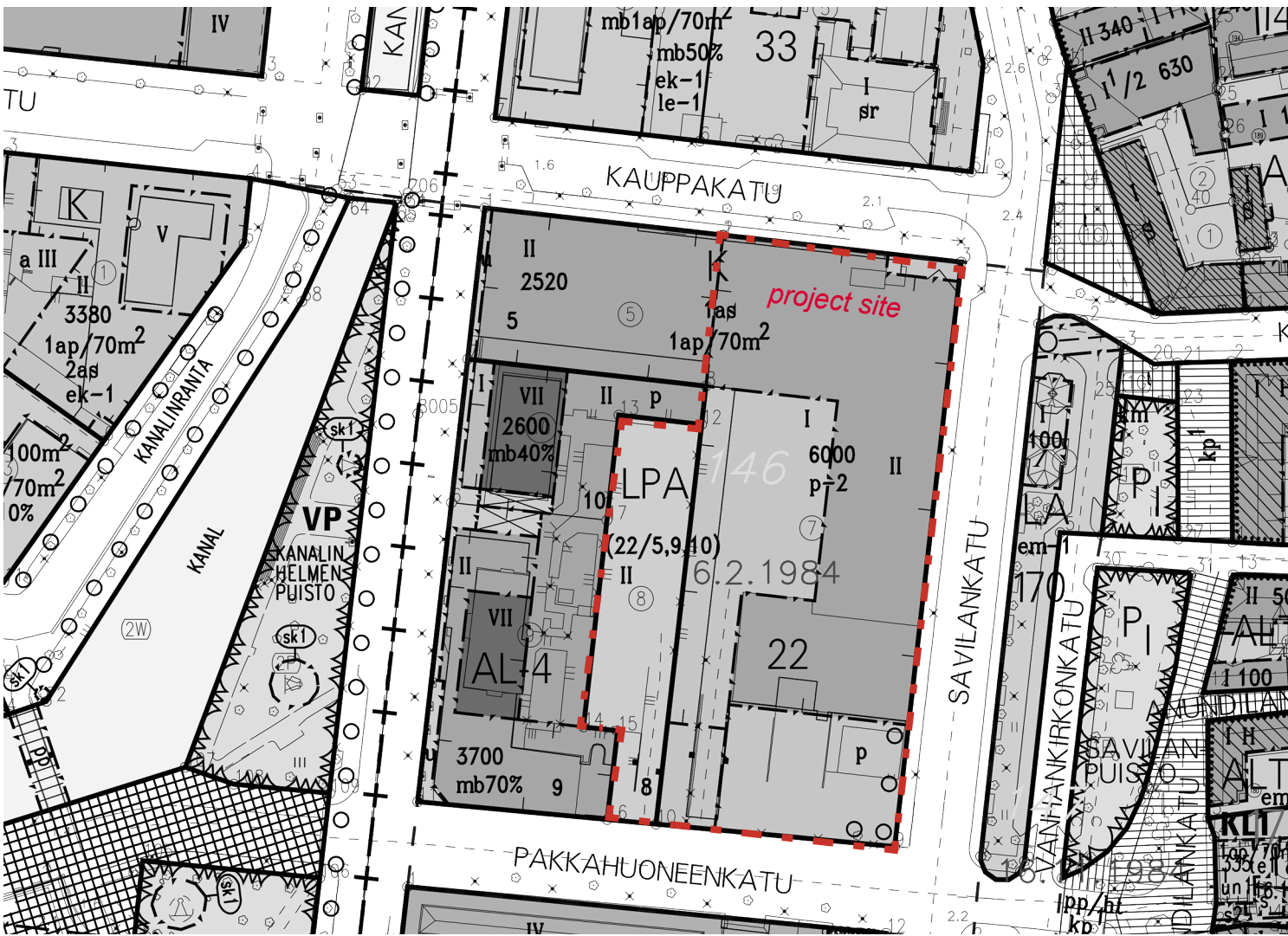
3. 4 Current situation of project site and existing building

The project site is in a block of 5 plots (plot number 5, 8, 9, 10, 22), All buildings in the block were built after late 20th century. In 1940 the whole block was almost empty yet except for few small buildings. Out of buildings which exist in the block now, the first one was built in plot.10 in 1962. The building is 7 floor height building, currently 1st and 2nd floor is used for commercial and upper floor is for housing. In 1965, second building was built in plot.5. The building is 2 floor height flat but large in foot print. The building is now used for banking business mainly. In 1970 larger building was built in plot.22 which is used for shopping center and there is parking space on the roof. In 1989 building of 7 floor height was built in plot.9. The its 1st floor is used by small shops and offices, 2nd floor is used as hotel, upper floor is for housing. Later year parking structure was built in the middle of the block, mainly in plot.8 but overlapping plot.9, plot.10 as well. The parking structure covers whole court space of the block with dark shadow.

In those plots, the plots for this thesis are plot.22 and 8. Originally I chose only plot.22, however I decided to design plot.8 together after research and discussion with town planning office. Because It was sure that re-organizing plot.8 together would make the whole block and the area around much better, and the town planning office wished as such. Plus, I got a conclusion after the discussion with town planning office that it would be more beneficial to demolish the parking structure and give fresh air to the court than to design something with keeping the structure.

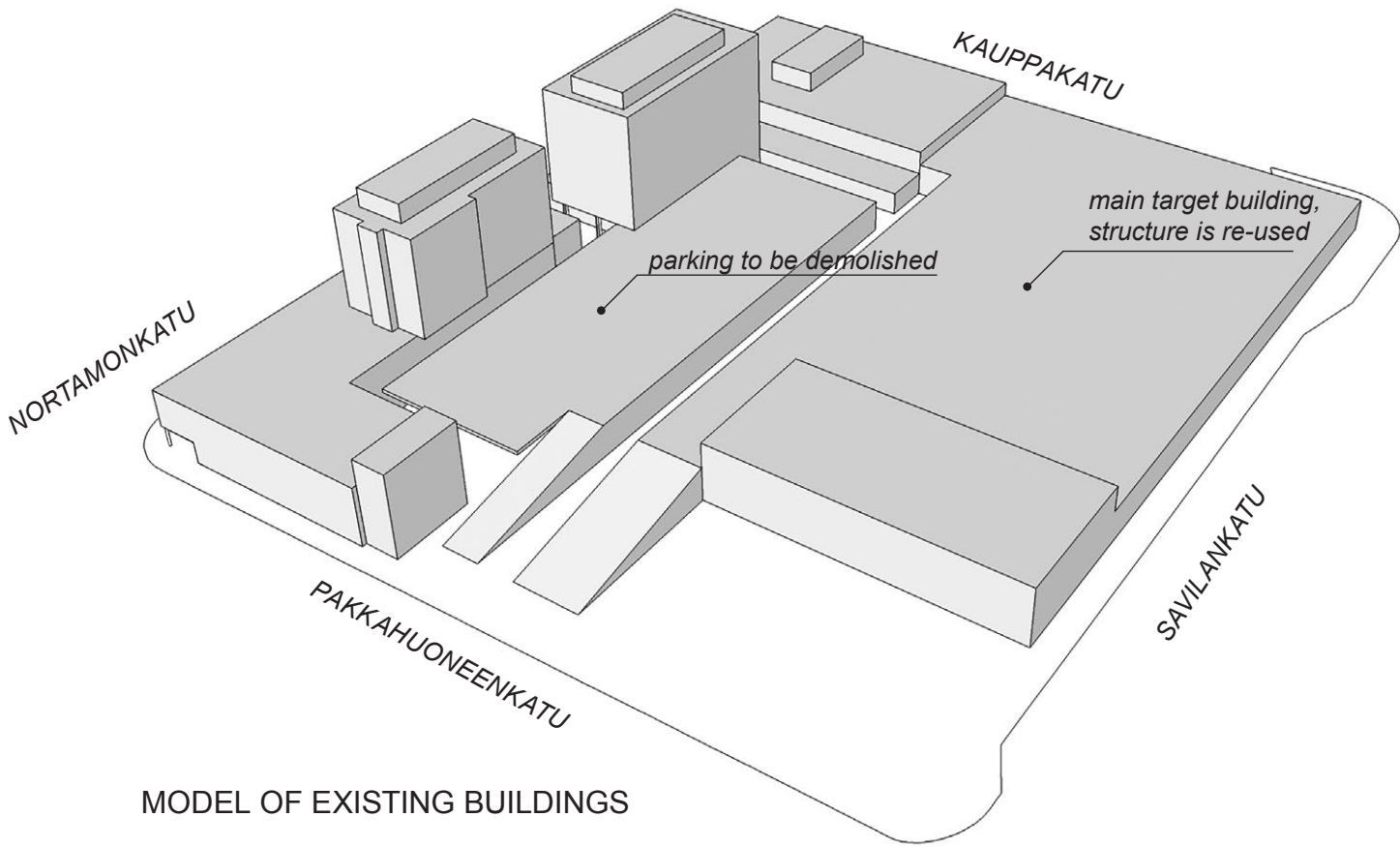
As a result and premise,

- 1. This thesis project is done in both plot.22 and 8.
- 2. Project is designed with keeping existing structure in plot.22 as much as possible. for the aim of this thesis.
- 3. The structure in plot.8 is demolished to accomplish better outcome for the area.



INFOMATION OF EACH BUILDING

<p>Plot.22 Completion : 1970. Site area : 5900m2. Structure : concrete structure, partly two storey Function : commercial 3200m2 , service and office space 1400m2 roof top parking 80ap</p>	<p>Plot.9 Completion : 1989. Site area : 2000m2. Structure : concrete structure, seven storey Function : 1-2F commercial 2350m2, 3-7F housing 1500m2</p>
<p>Plot.5 Completion : 1965. Site area : 1500m2. Structure : concrete structure, two storey Function : commercial 2600m2</p>	<p>Plot.8 (and 9, 10) Structure : concrete structure, two storey Function : parking 80ap</p>
<p>Plot.10 Completion : 1962. Site area : 1100m2. Structure : concrete structure, seven storey Function : 1-2F commercial 750 m2, 3-7F housing 1800m2</p>	

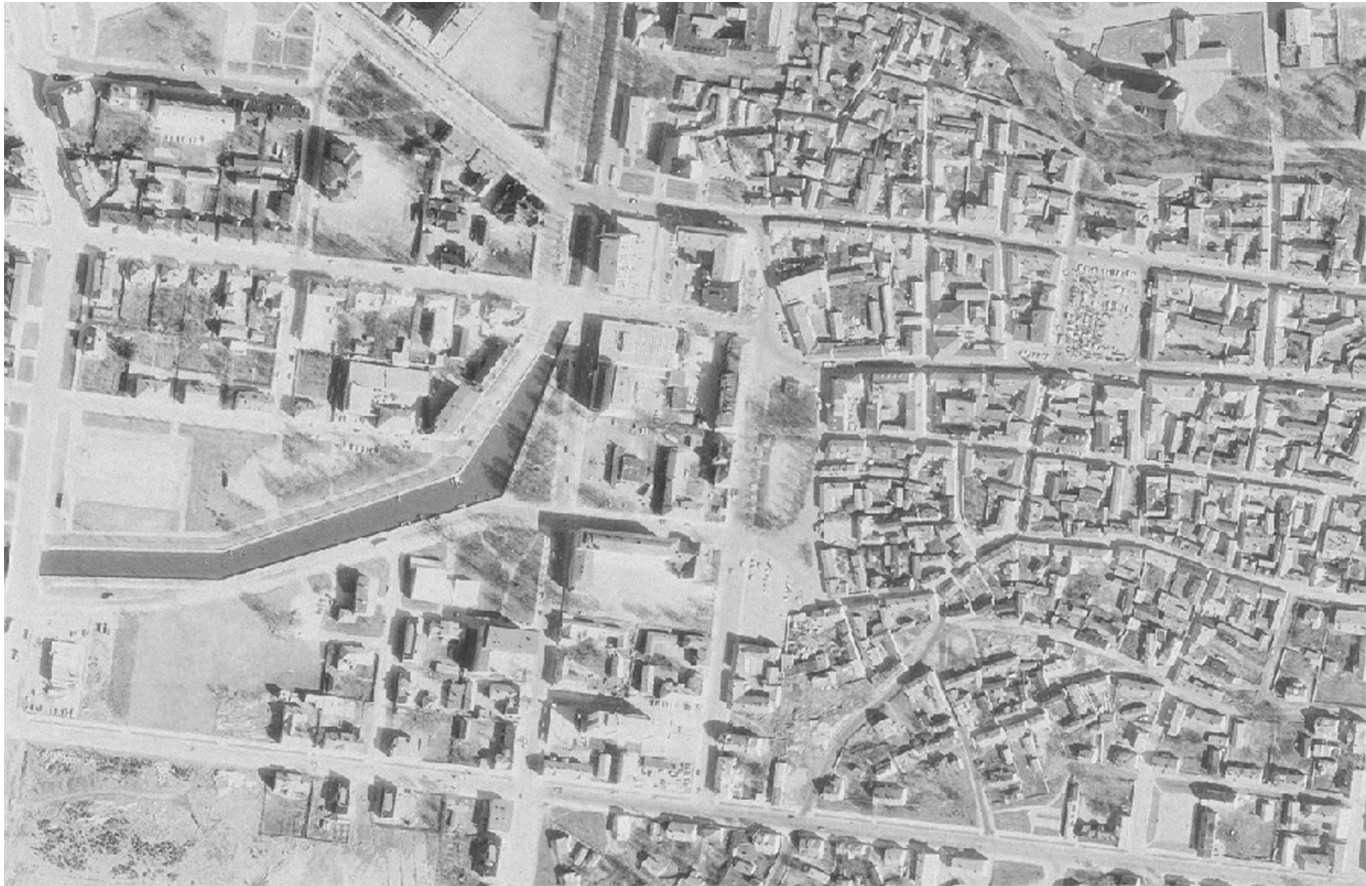


MODEL OF EXISTING BUILDINGS

Development of the site



1940



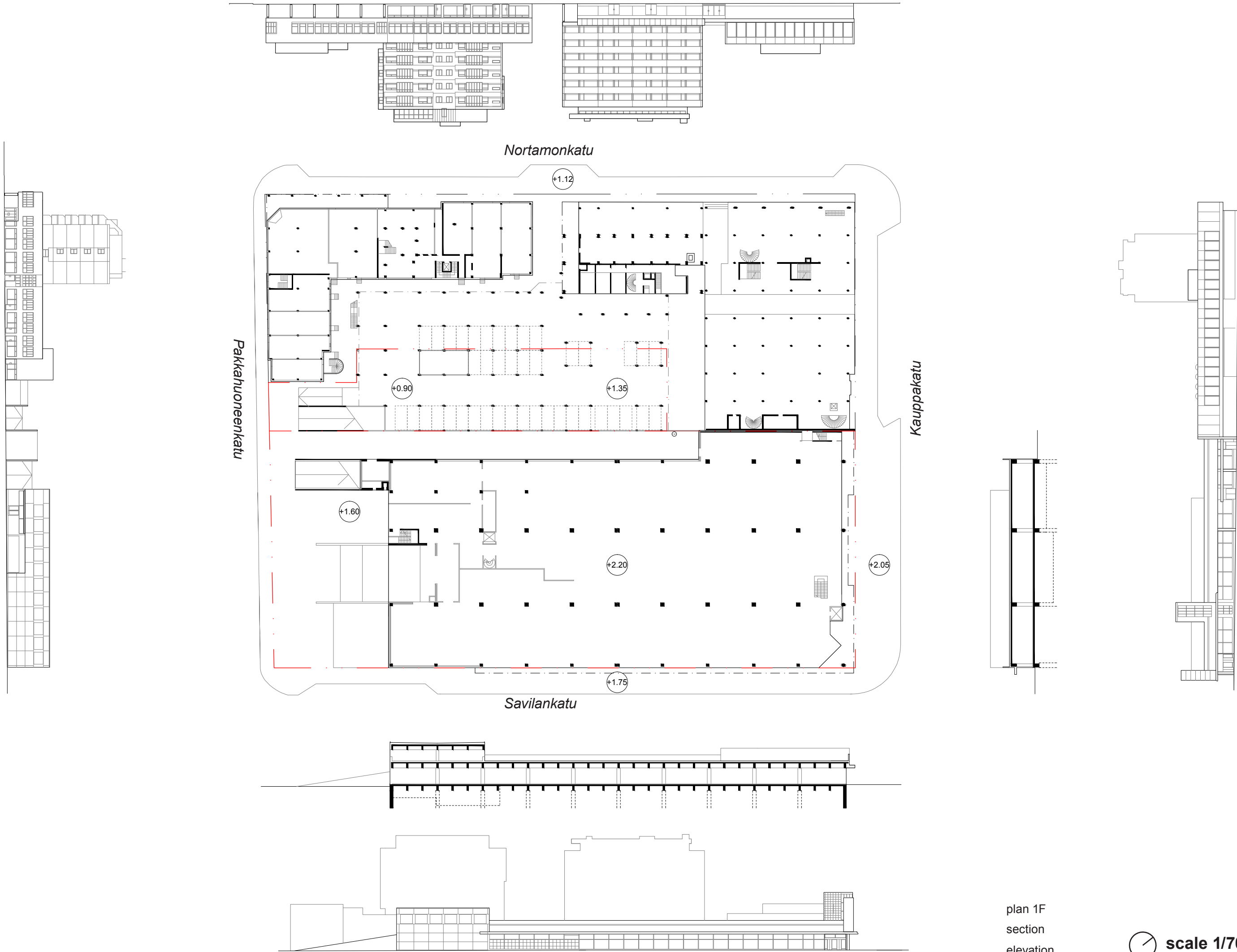
1965



1977

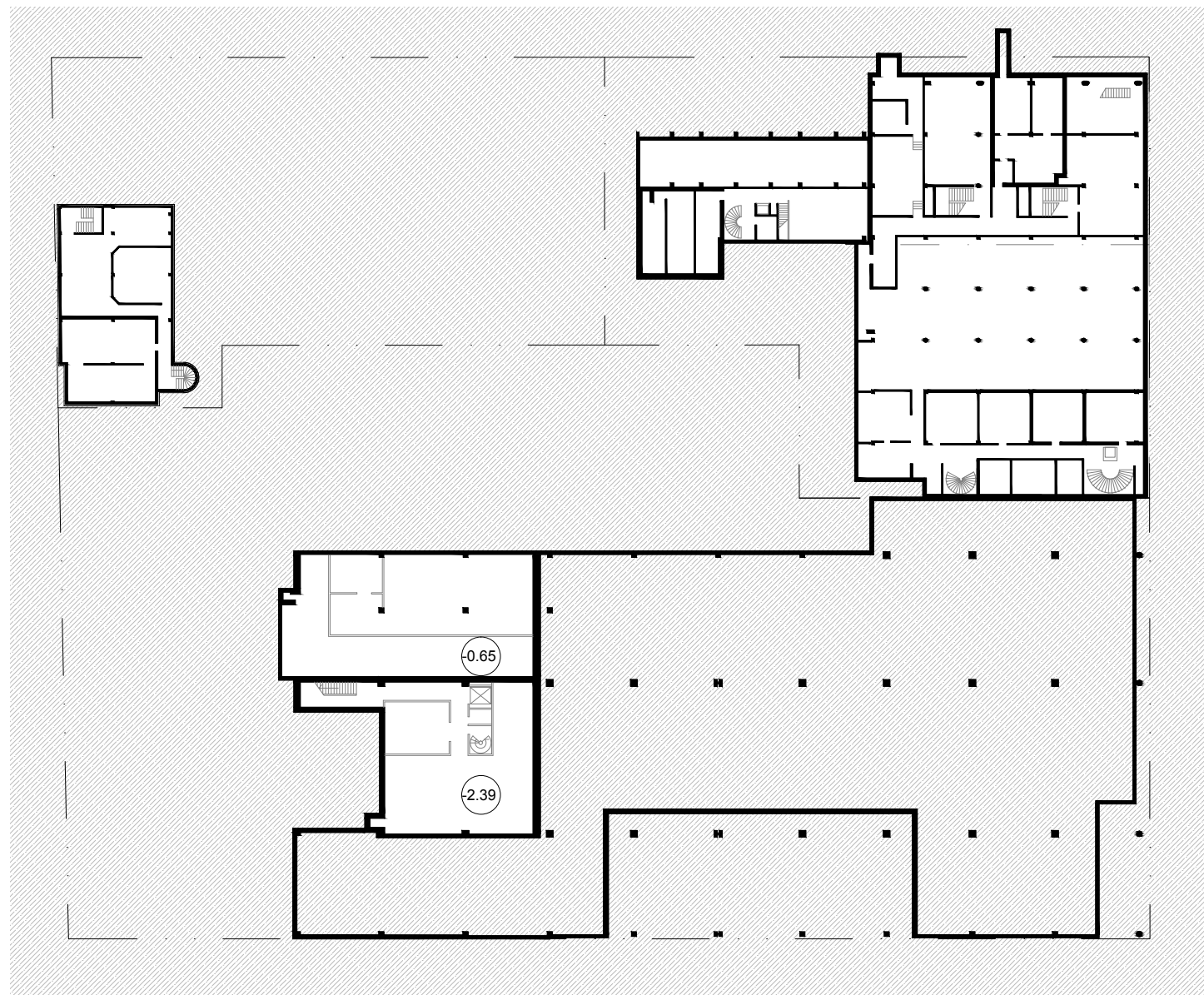


2011

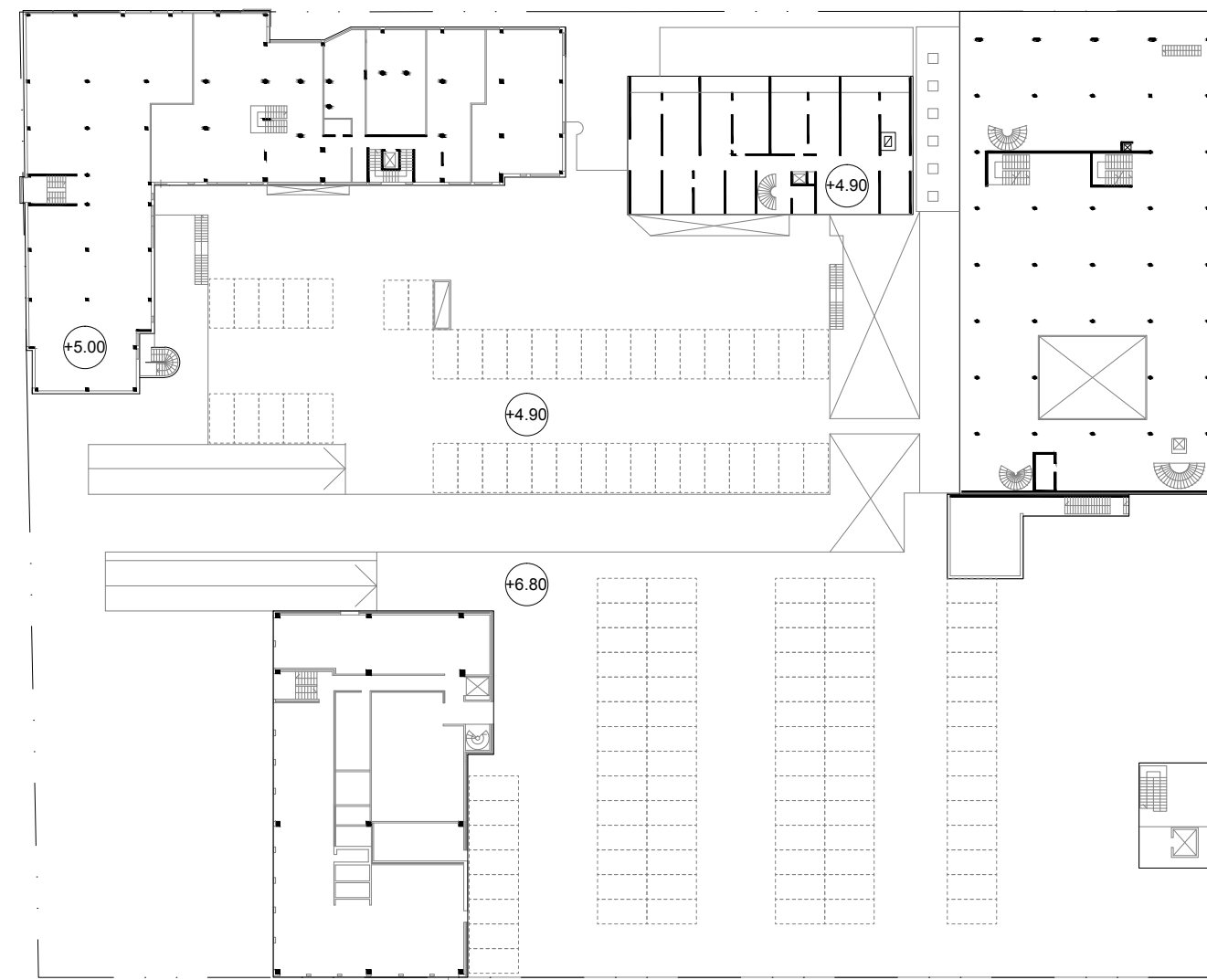


plan 1F
section
elevation

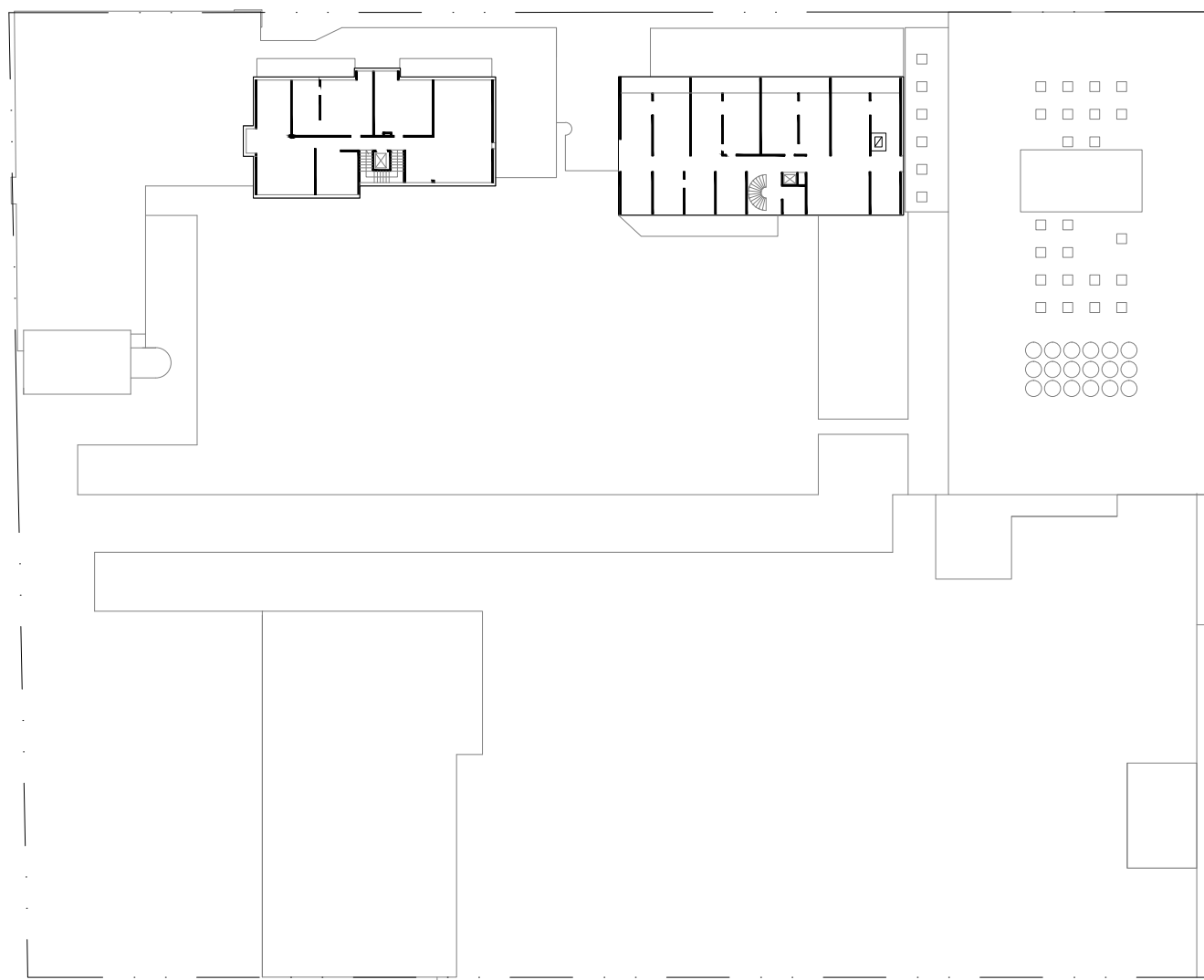
scale 1/700



plan B1



plan 2F



plan 3-7F

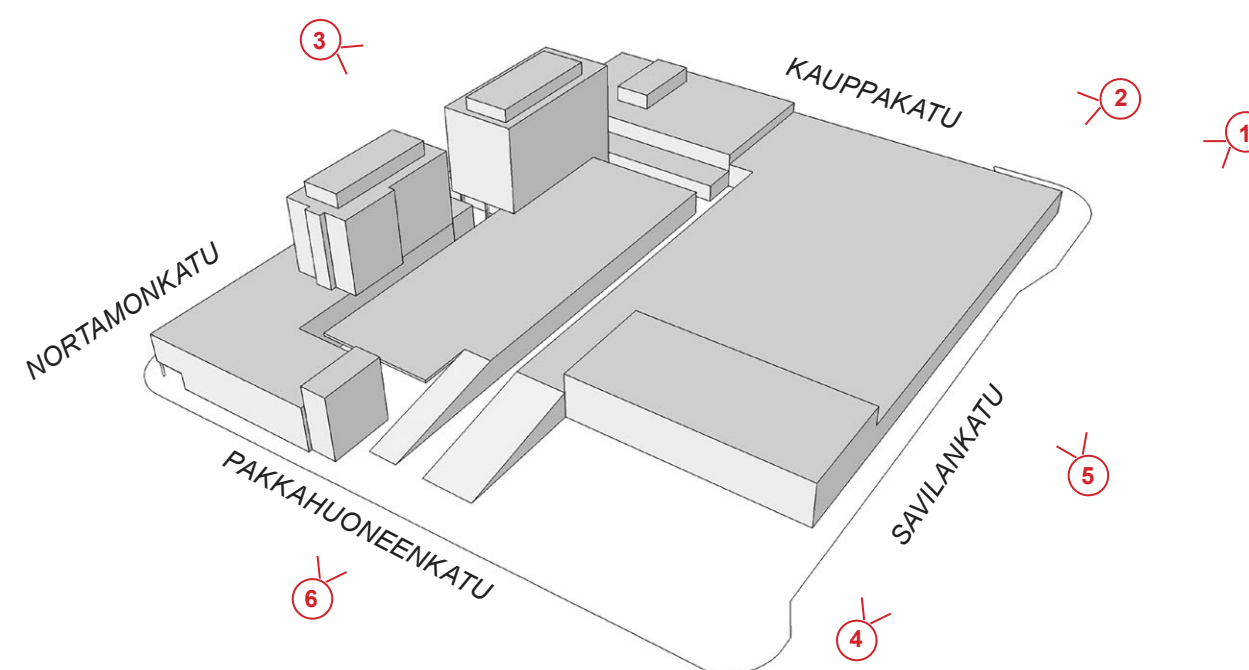
The Building in plot.22 is large flat single storey building except for a small 2nd floor for office use. There is small space at under ground level as well.

The structure is concrete, its basic pillar size is huge 750 x 750 mm, primary beam size is 950 x 750 mm, secondary beam size is 950 x 350 mm at first floor to support roof top car parking. At second floor, pillar size is 550 x 550 mm, primary beam size is 800 x 550 mm and secondary beam size is 800 x 250mm. The foundation is long pile of concrete.

The structure has aged only 45 years and most of them have been inside, some pillars at north-east side have been outside but been covered with protection. From this condition and their sizes, it is possible to think that the structure is still healthy and have enough potential to accept more loads for extension.

In contrast, condition of facades are poor. Long glass wall along shops are totally covered with advertizements and display products, so the building looks turned its back to the town. This must be one of the reason why the street Savilankatu in front of the building is always empty in spite of it is in the center of the town and near to its active streets (Kauppakatu, Kuninkaankatu). The used materials look already dirty and exhausted. First of all, It looks that there must have been better material for the building which is right next to the Old Rauma.

The building has problem in interface to the town in spite of its strong structure inside. This is the reason why the site and building was chosen for the thesis.





1. View at corner of Kauppakatu and Savilankatu
There is entrance of the shopping center



2. View along Kauppakatu
Glass wall is totally closed with advertizements and products



3. View from Nortamonkatu, looking inner court of the block covered with parking structure



4. View along Savilankatu,
most of the time the street is empty

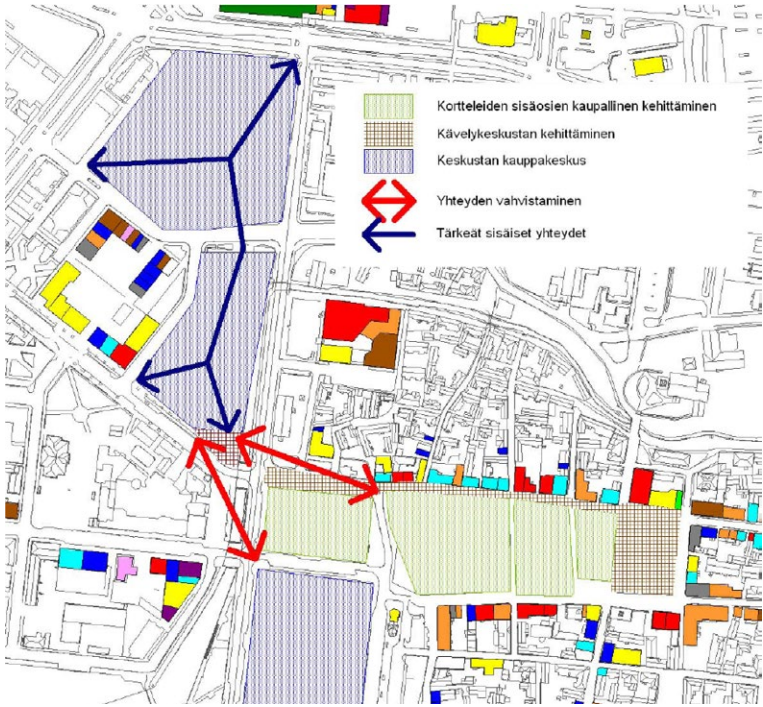
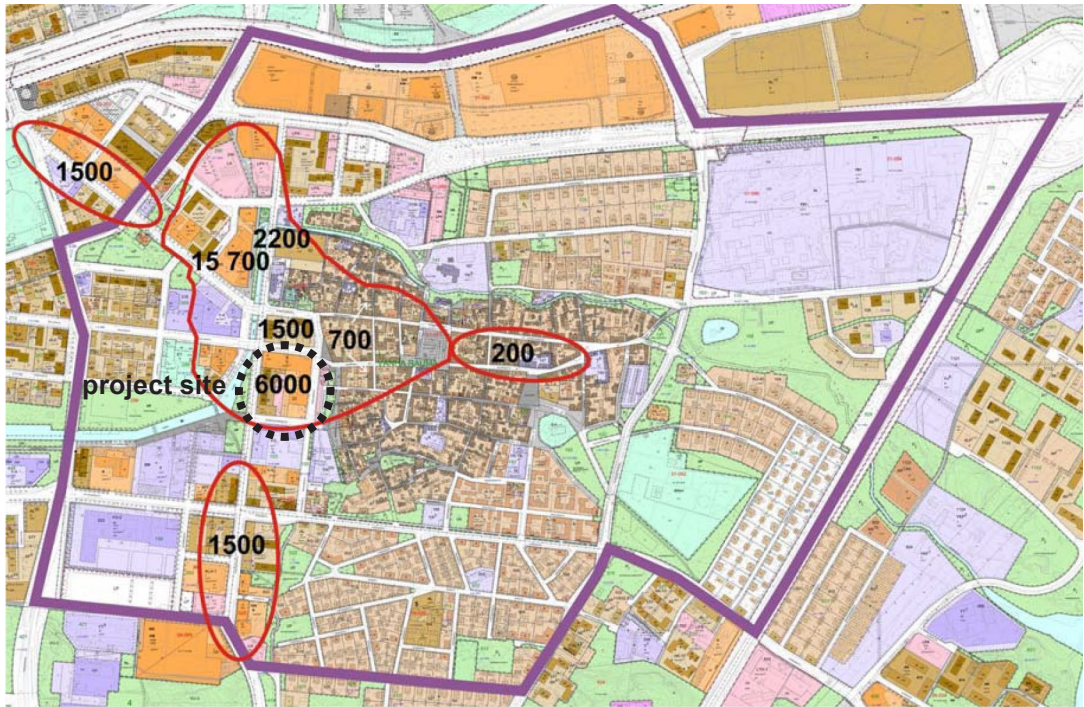


5. View along Savilankatu,
people can not see inside of the building at all



6. View from Pakkahuoneenkatu,
two ramps to the parkings

3. 5 New town plan and previous proposals for project site

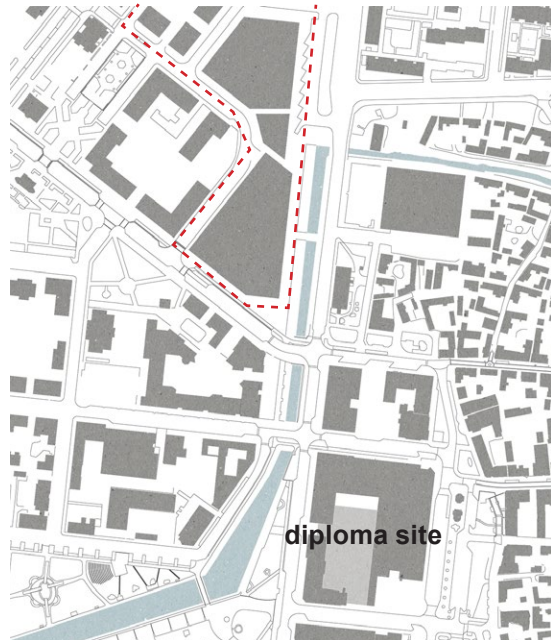
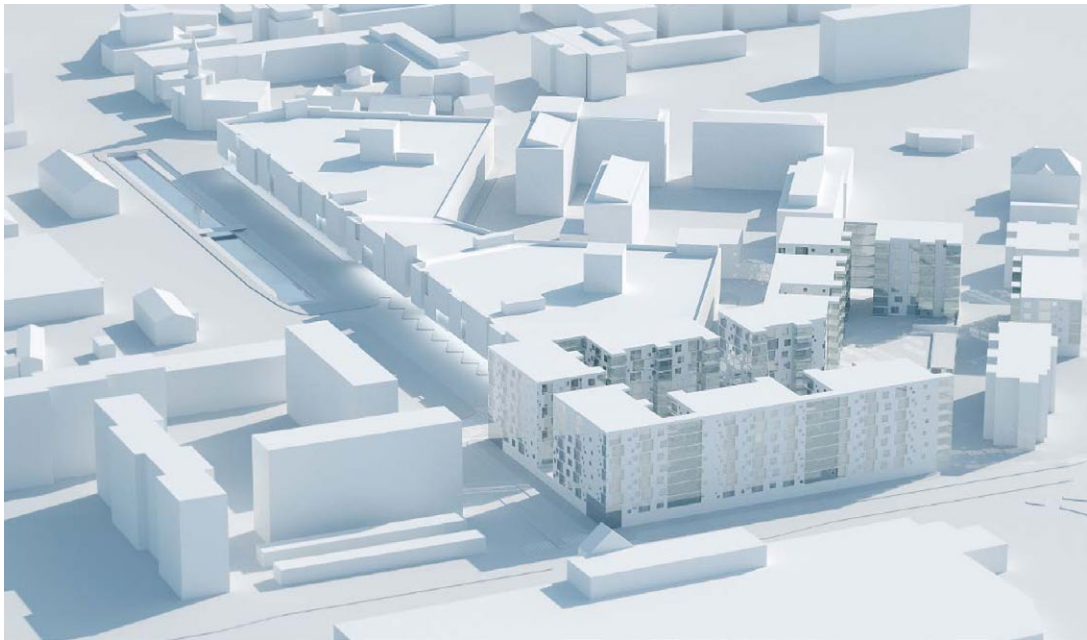


New townplan and coming project

In a sketch of new town plan published in March 2013 by Rauma town planning office, the area around the diploma project site is in target area of development. The block where the diploma site is in is estimated increase of 6000 m2. Town planning office has also plan to enforce inside and outside pedestrian connection around new shopping center and Old Rauma area. The block of diploma project is involved in the plan and estimated as commercial use.

Proposal competition was held for the new shopping center with new bus center for local and log-way bus on Nortamonkatu near the diploma site. Winning entry was from JKMM Architect. (The plan has been in development by town planning office, JKMM Architects is not involved in the process anymore.)

The winning entry included,
20400 kem2 commercial space
30110 kem2 housing
975ap parking



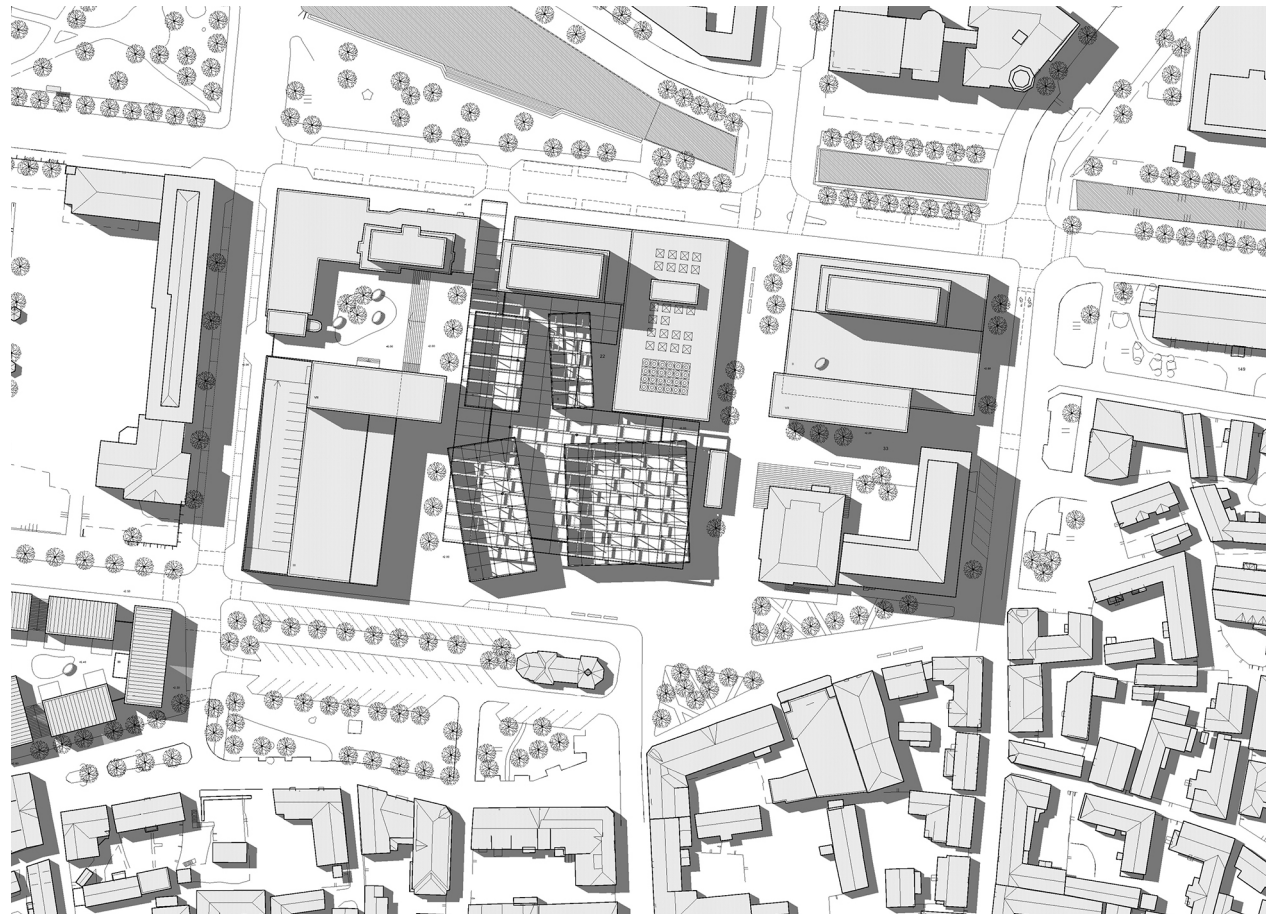
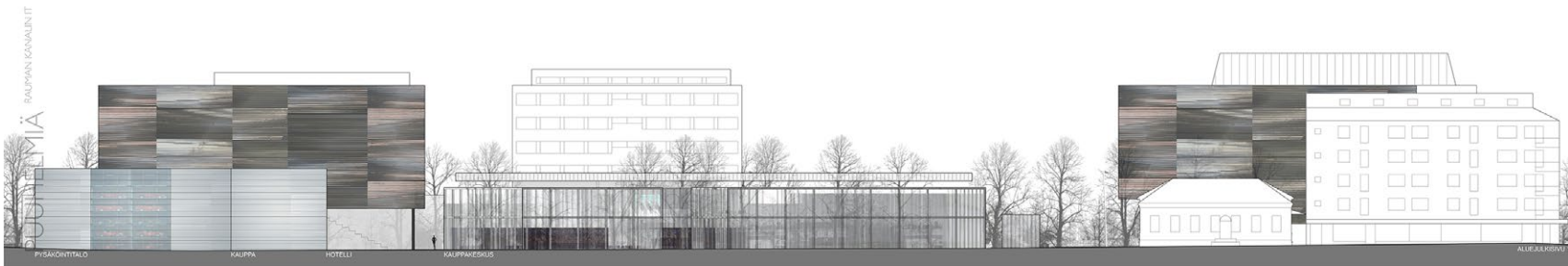
Previous proposals for the site of diploma project

Winning entry of competition in 2007 / Vesa Honkonen Architects

proposal includes (only in diploma site),

- 2200 m2 hotel
- 6000 m2 commercial
- 244 ap parking

existing building is demolished

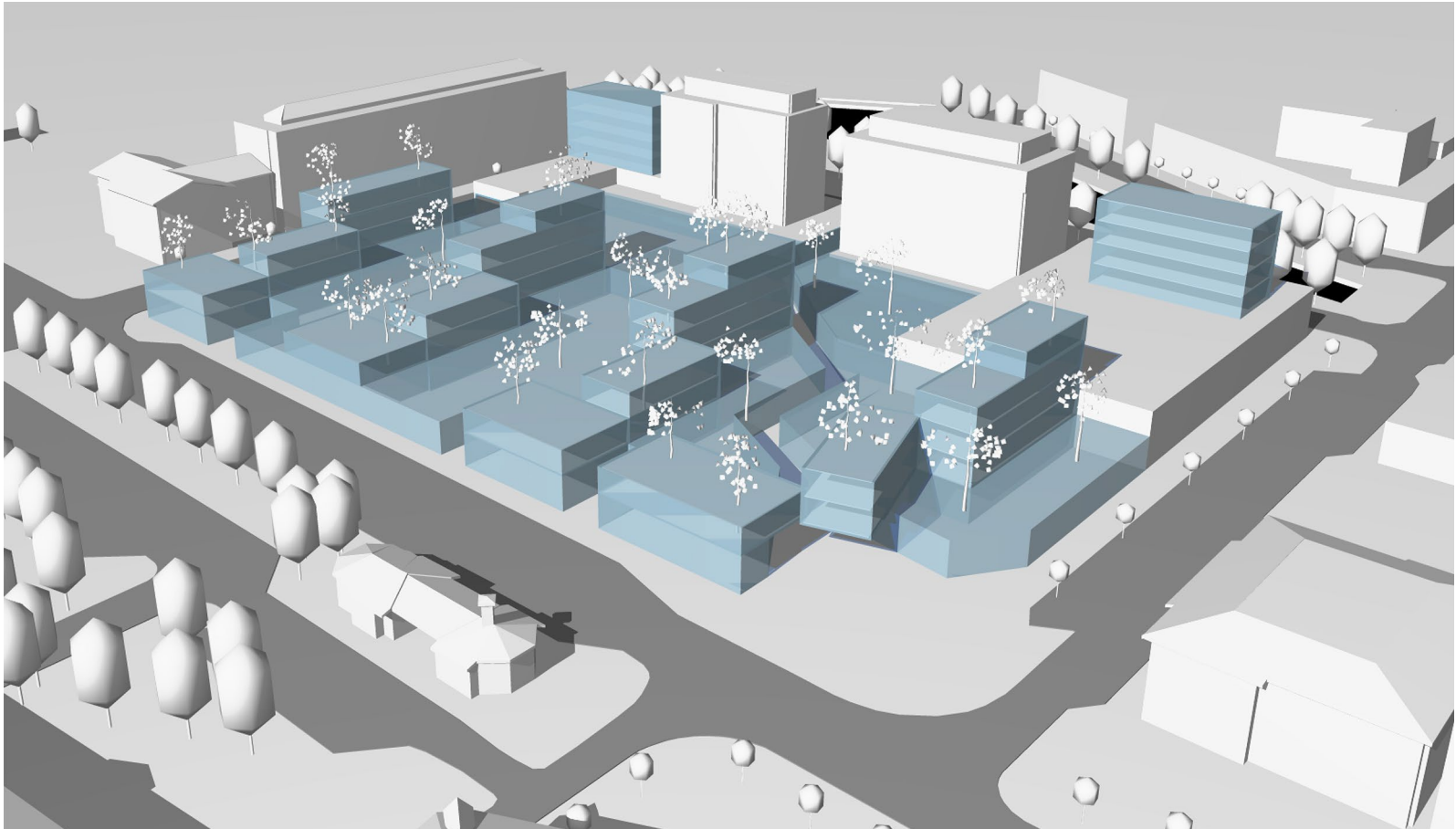
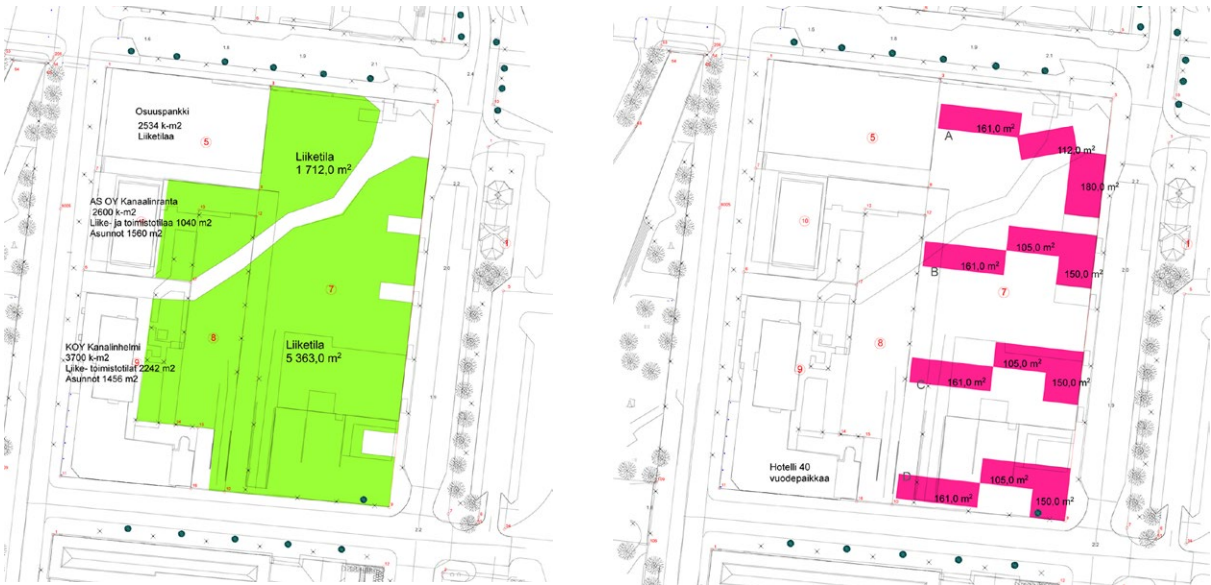


Winning entry in competition in 2011 / A3 Architects

proposal includes,

- 7075 m2 commercial
- 5300 m2 housing
- 7500 m2 parking

existing building is demolished





sports field

old station

school

new shopping center

kindergarten

auditorium

church

hospital

Rauma hall

townhall

cinema

museum

theater

school

music school

library

police

adult education center

fire station

sports facility

3. 6 Functional analysis

Current situation

The functinal-scape of Rauma is clear as seen on the map. Townhall is at the center, commercial area locates around it and cultural facilities spread around next. Cultural hub is at the corner of canal with green area, there are theater, music school, library and adult education center. There is old station which is not in use now at west, and vast school area is next to it, Rauma hall is close to it. At north there is two big shopping centers along the road which leads to Helsinki. The colour of commercial around here will be increased because the new shopping center is about to be built at little south from them along Nortamonkatu.

The project site is at the very center of the town in the commercial area and its ground level is fully used as commercial. There is cinema at north-east of the site and school is at south side. Looking carefully at green colours, cultural and education facilities, it is seen that the project site is on the line of green.

It is possible to estimate that the public path can be drawn from cinema to cultural hub space if the project site worked culturally or educationally or publically.

Functions in need

1. Hall of middle scale

There is a small wooden auditorium at little north of project site (Poselli), and there is Rauma hall at west with capacity of 400 seats. It was founded that the town needs middle scale hall for casual use at easy accessible place for everyone, by discussing with town planning office.

2. Extra space for music school

There is a music school at south of the project site. The building is 6600m2 in total and 23 classrooms inside. The school building was originally built for teaching nursing and economics. It was started to be used as music school in 1995. The building is not enough good and spacious for the reason and the school needs extra classrooms nearby. And hall space for practice and concert was required as well because they have only 100m2 space for the purpose in current building.

3. Extra space for adult education center


There is an adult education center at south of the project site. It was founded in the discussion with personnel of cultural service in town hall that the facility is in poor condition and more spaces are needed with better quality.

4. Housing

As common need in most of the city, Rauma has need of more housing at central. The need was founded by the discussion with town planning office.

 commercial

 cultural, educational

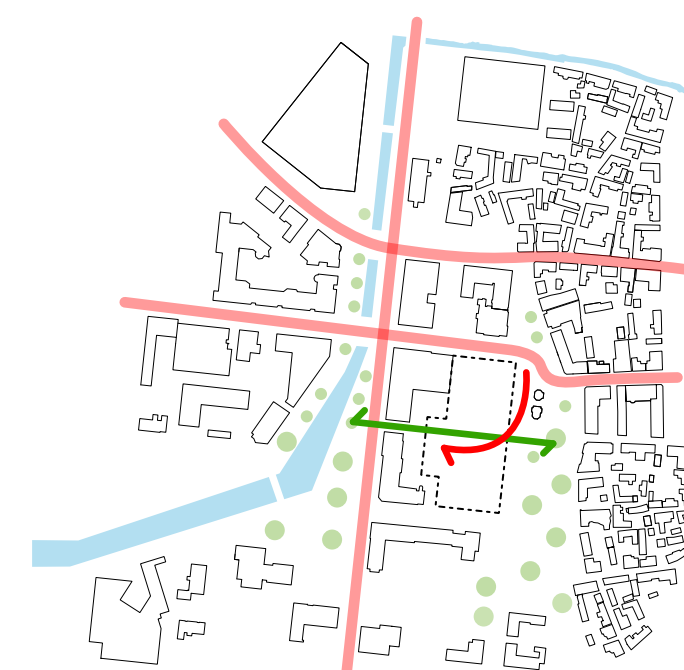
 public, municipal

 office

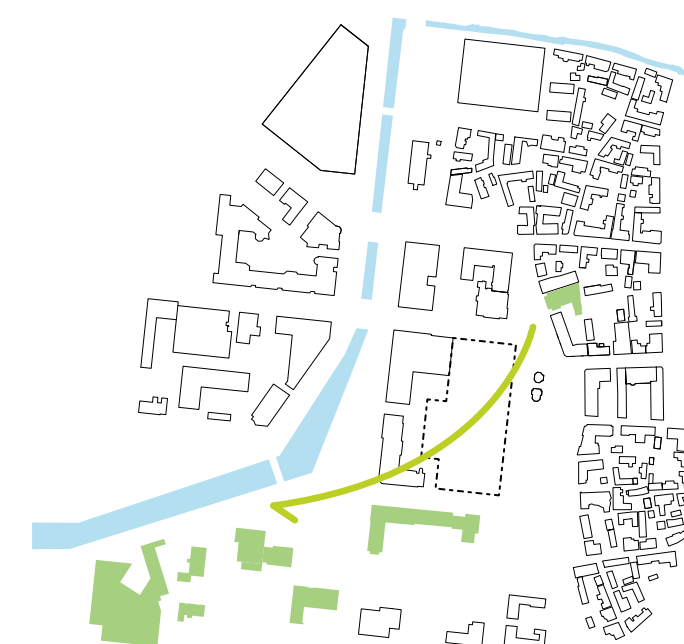
4 : PROGRAM REQUIREMENT
AND GOALS TO ACHIEVE



connect different block shapes
connect different building scales
connect different building materials



connect pedestrian activities
connect green spaces



connect cultural functions,
from cinema to school ,theater and library

Programs for the project

From the section of 3.5 it was revealed that Rauma town planning office has plan to develop the site as commercial use as it is now.

From the section of 3.6 it was found that it will make town more fascinating to use the site more for public usage to connect cultural line from cinema to library, north of the site to south.

And there are needs of middle scale hall, music facilities, classrooms and housing.

As a conclusion, **the project is designed as hybrid building of commercial, cultural, educational, residential and parking.**

Goals to achieve

Through the research of the site, it was shown that the site is at the border of various different aspects of the town.

The site is in between Old and New area of the town.

The site is in between organic and straight town block form.

The site is in between small and big building scale.

The site is in between wood and concrete building material.

The site is in between active pedestrian routes , along Old Rauma and along canal.

The site is in between two green spaces, one on Savilankatu and one in canal park.

The site is in transition of town function, commercial to cultural.

This project has goals in connecting and buffering these differences and transition.

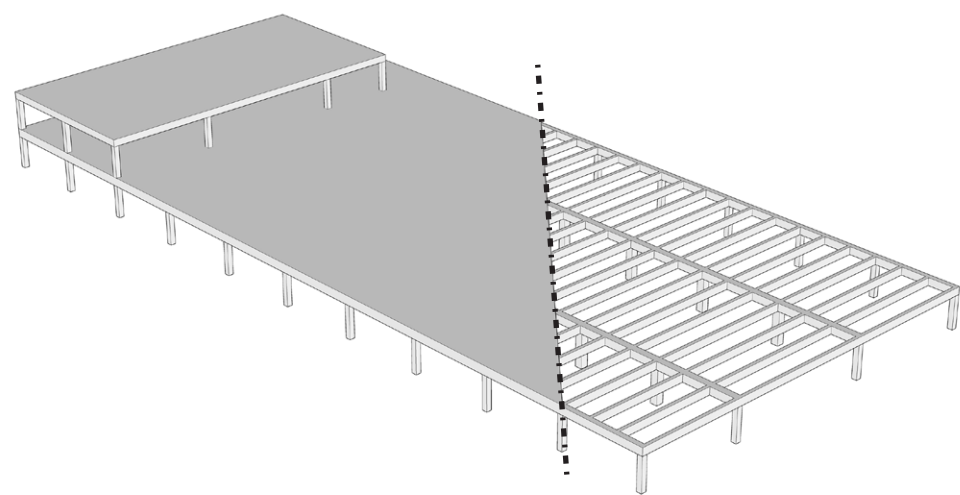
5 : DESIGN STUDY



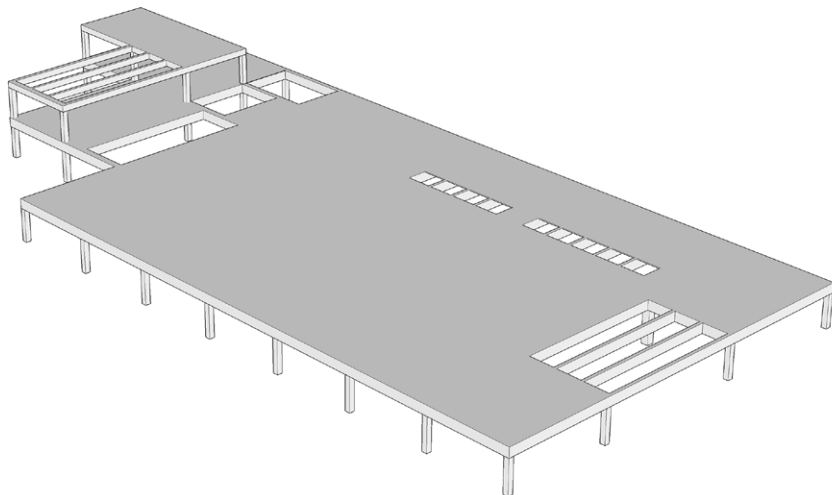
Perspective from market square

APPLICATION OF FOUR CONCEPTS OF WOODEN EXTENSION

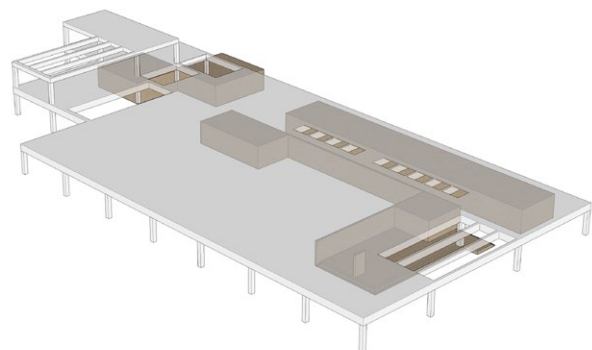
The project is designed with four concepts studied in part two.



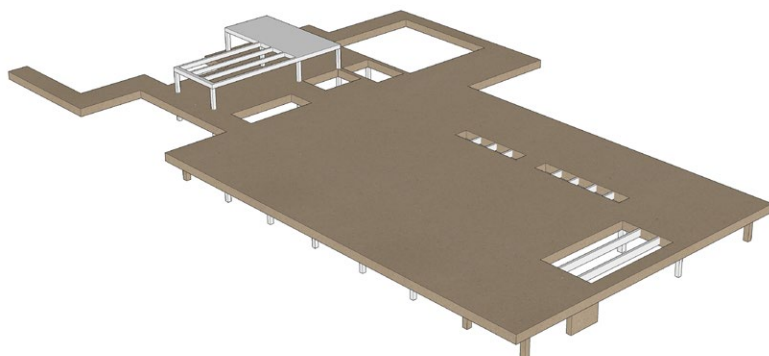
Original structure



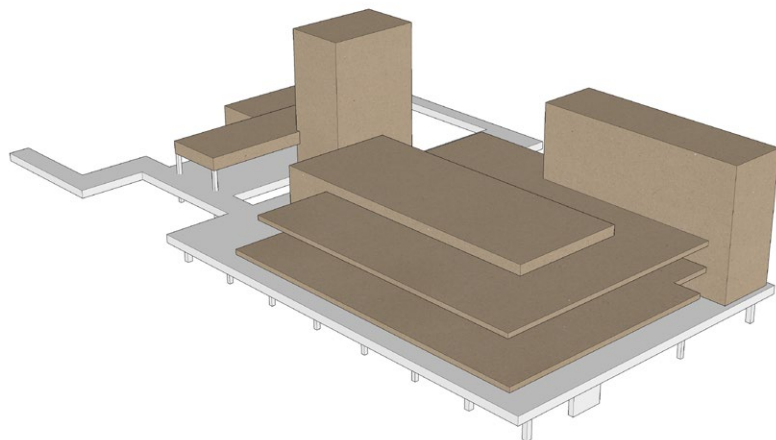
Partial demolition of beam, pillar and slab plate



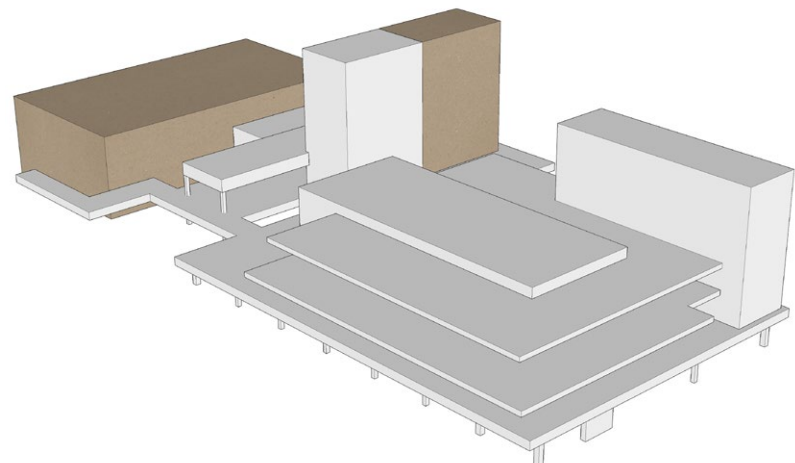
IMPLANT
Separation of space under the existing structure.



ATTACH
Covering beams and some pillars of the existing structure to protect against outer environment, and to increase visual quality.

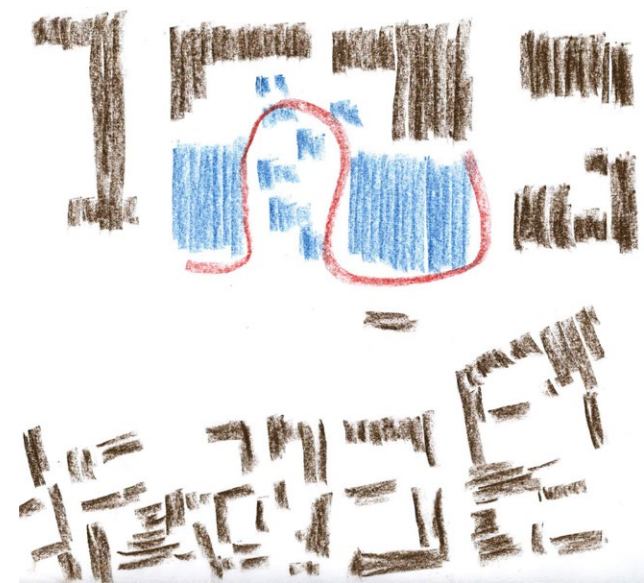


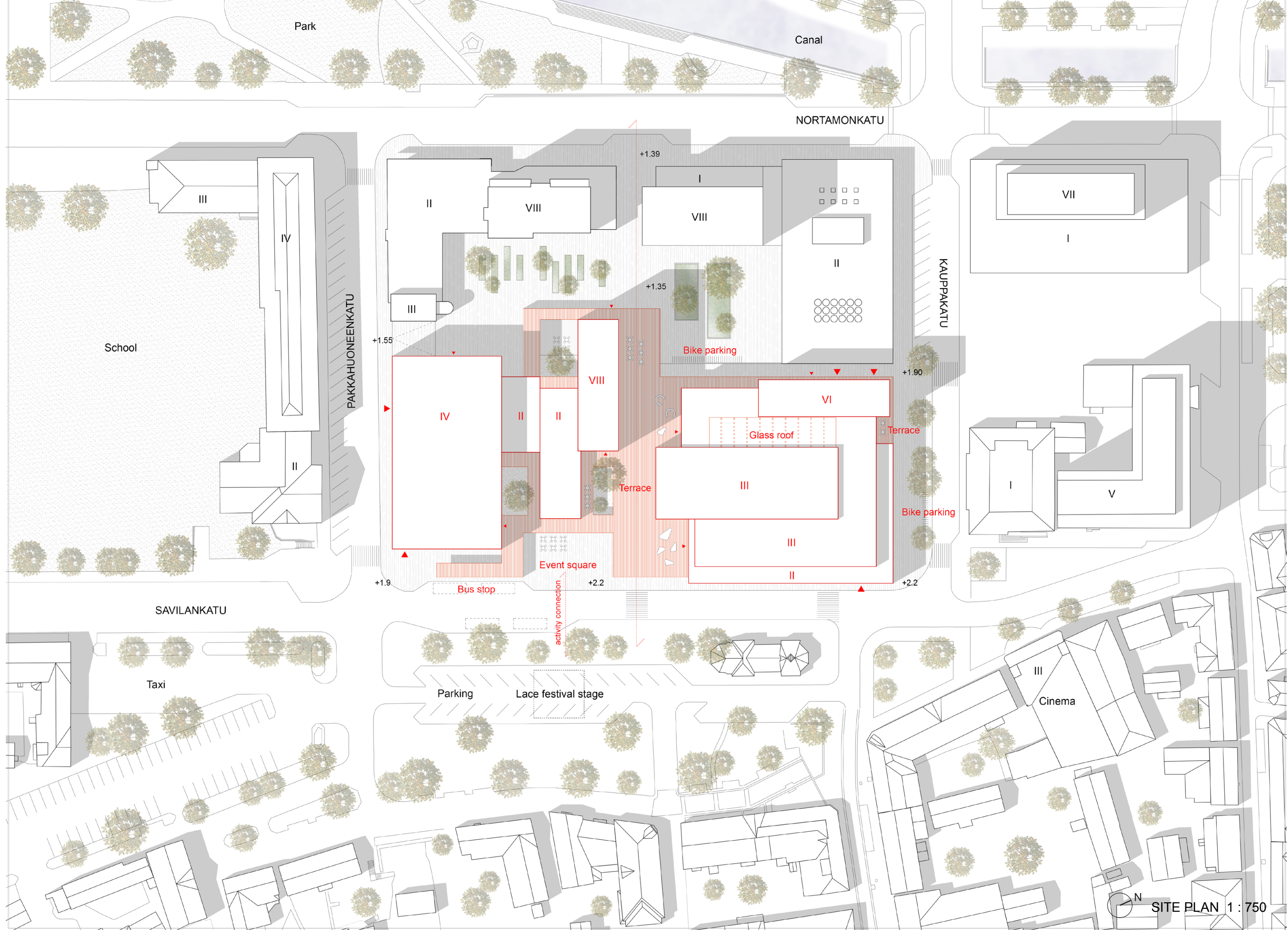
VERTICAL
Vertical Addition of floor area on the existing structure.



HORIZONTAL
Horizontal Addition of floor area besides existing structure.







Park

Canal

NORTAMONKATU

VII

I

KAUPPAKATU

V

III

Cinema

SAVILANKATU

Taxi

Parking

Lace festival stage

activity connection

Event square

Bus stop

Bike parking

Bike parking

Terrace

Glass roof

Terrace

+1.39

+1.35

+1.55

+1.9

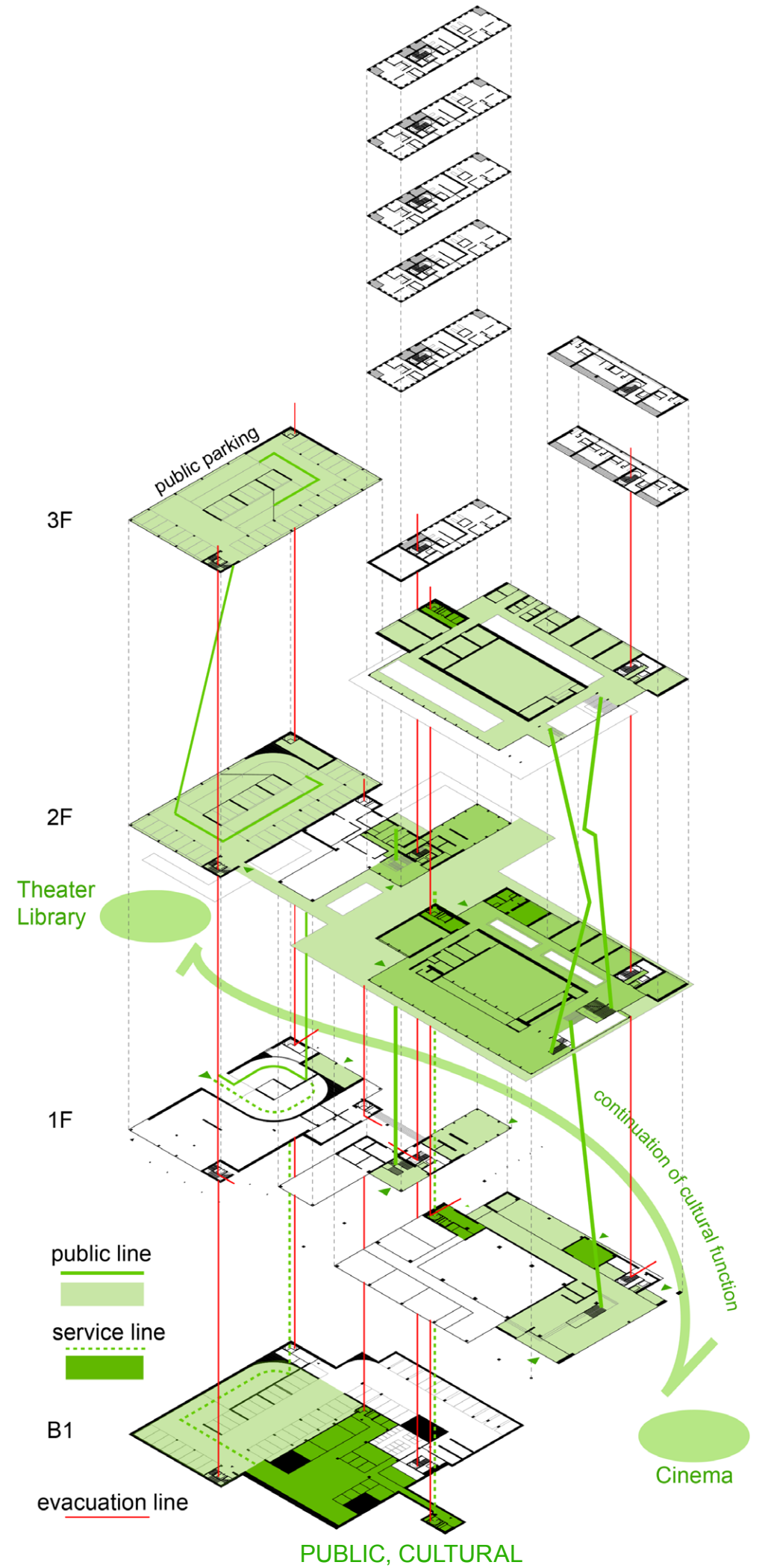
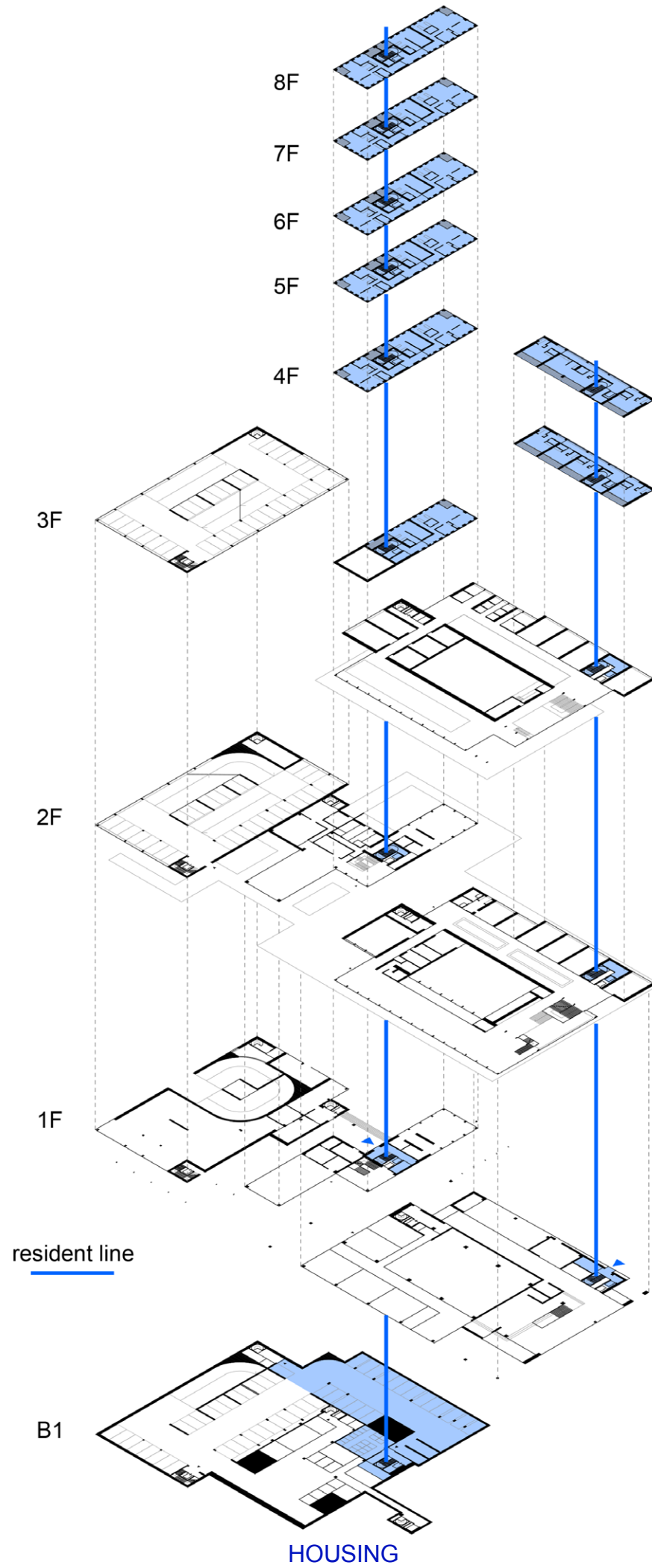
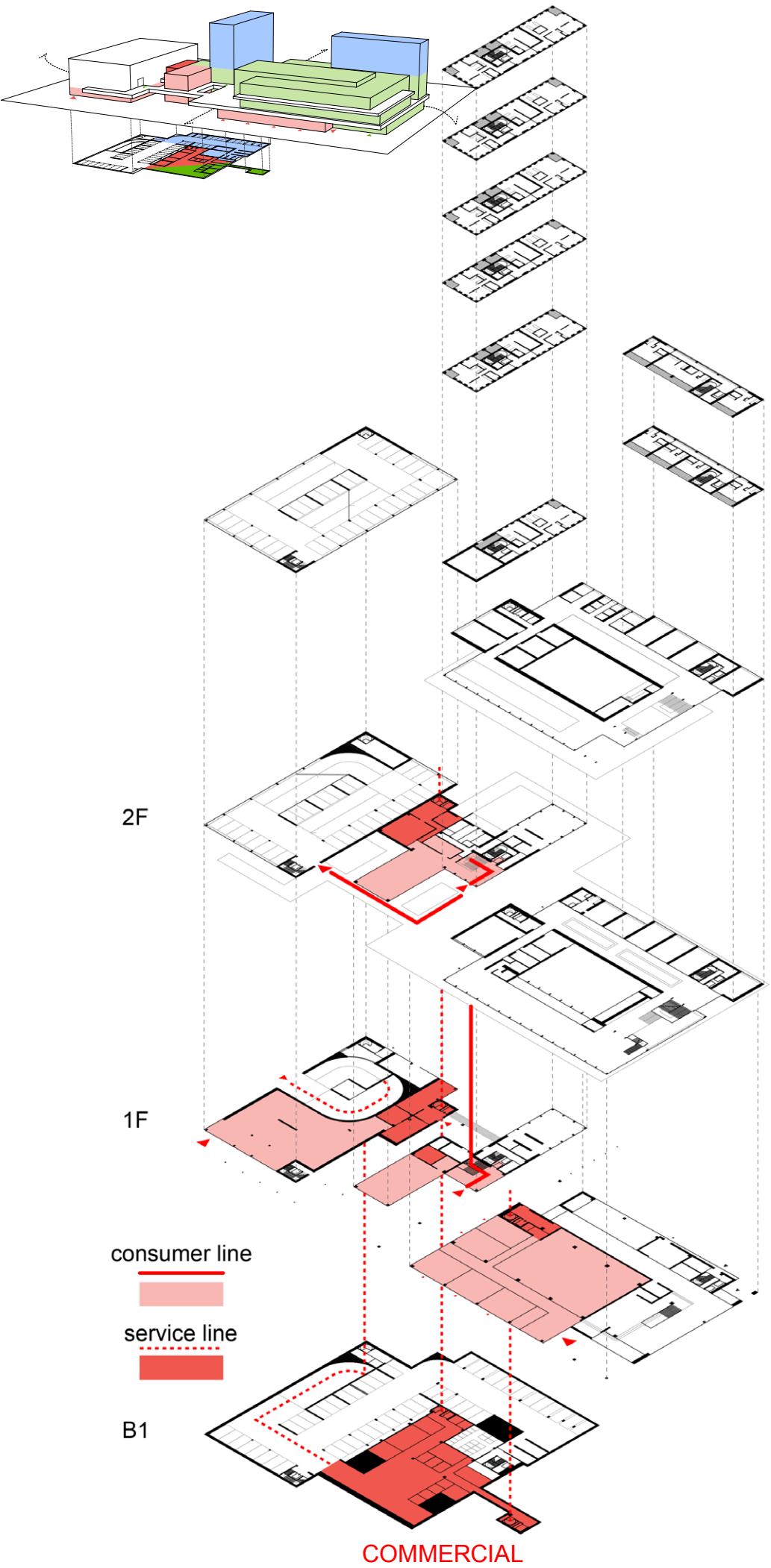
+2.2

+2.2

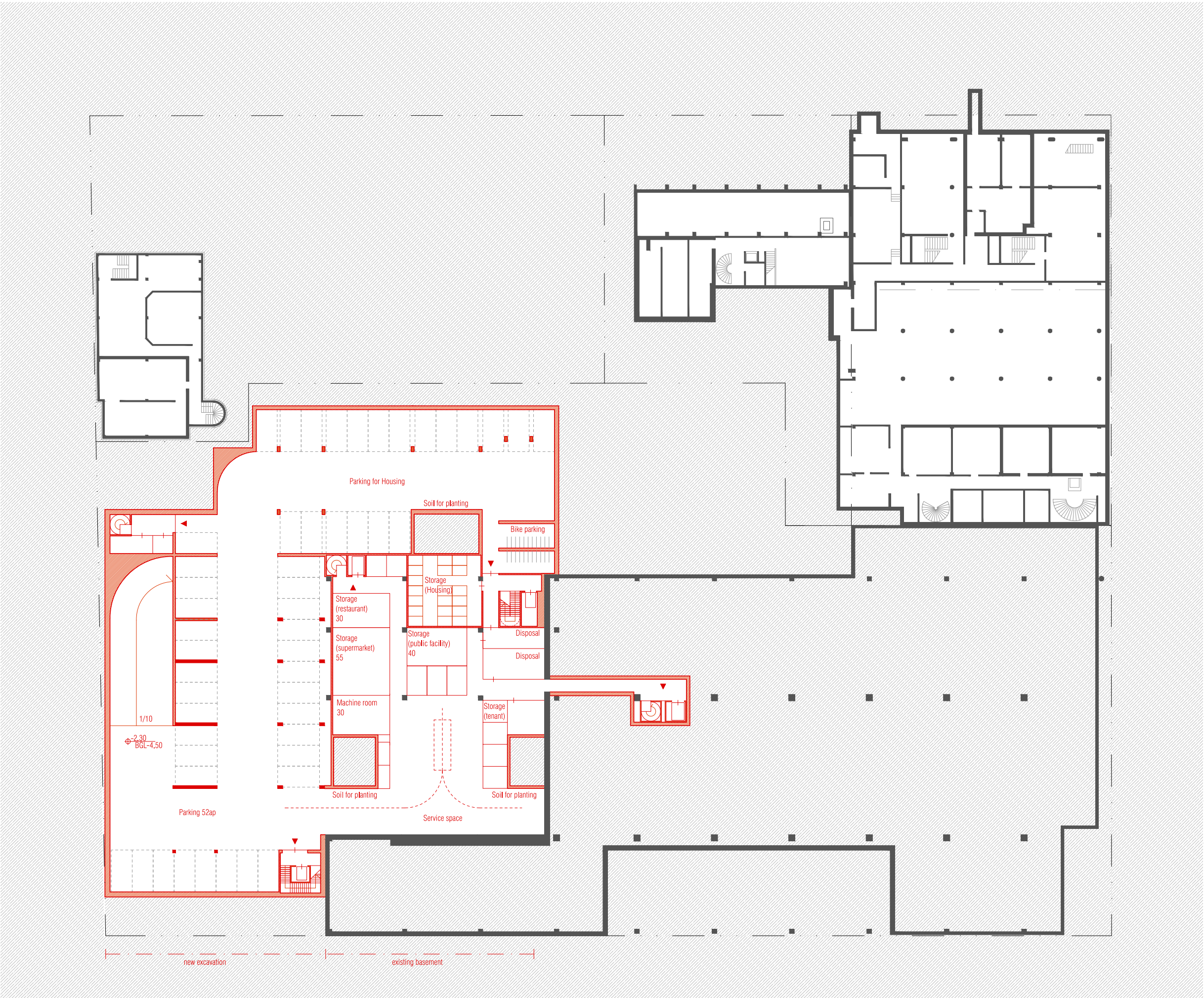


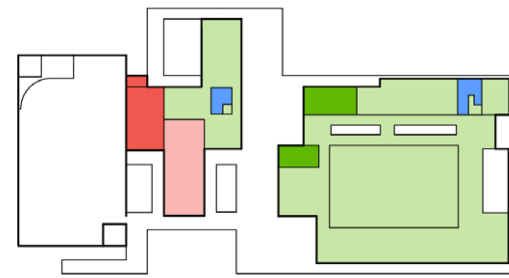
SITE PLAN 1 : 750

FUNCTION ARRANGEMENT
AND ROUTE DIAGRAM

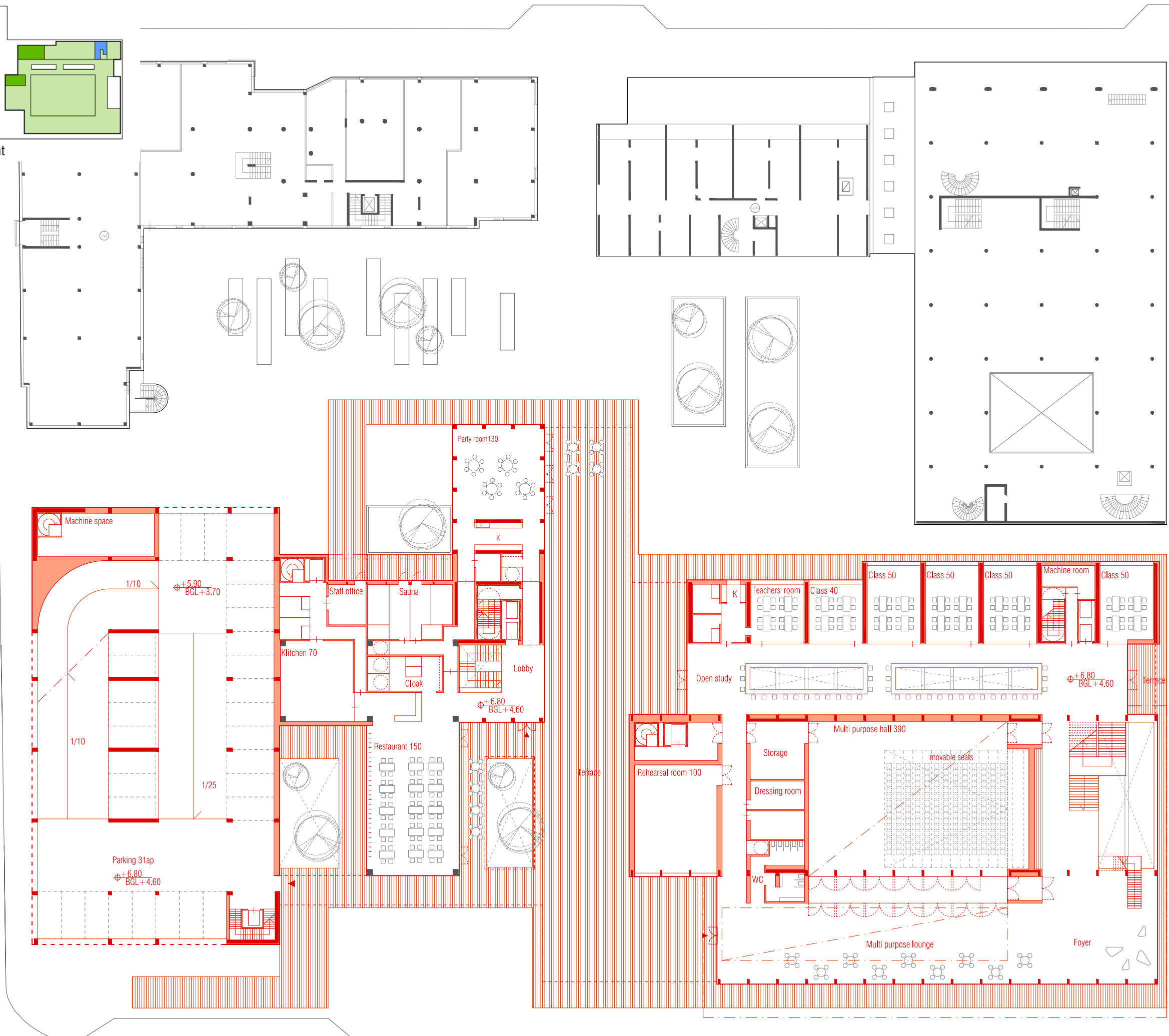




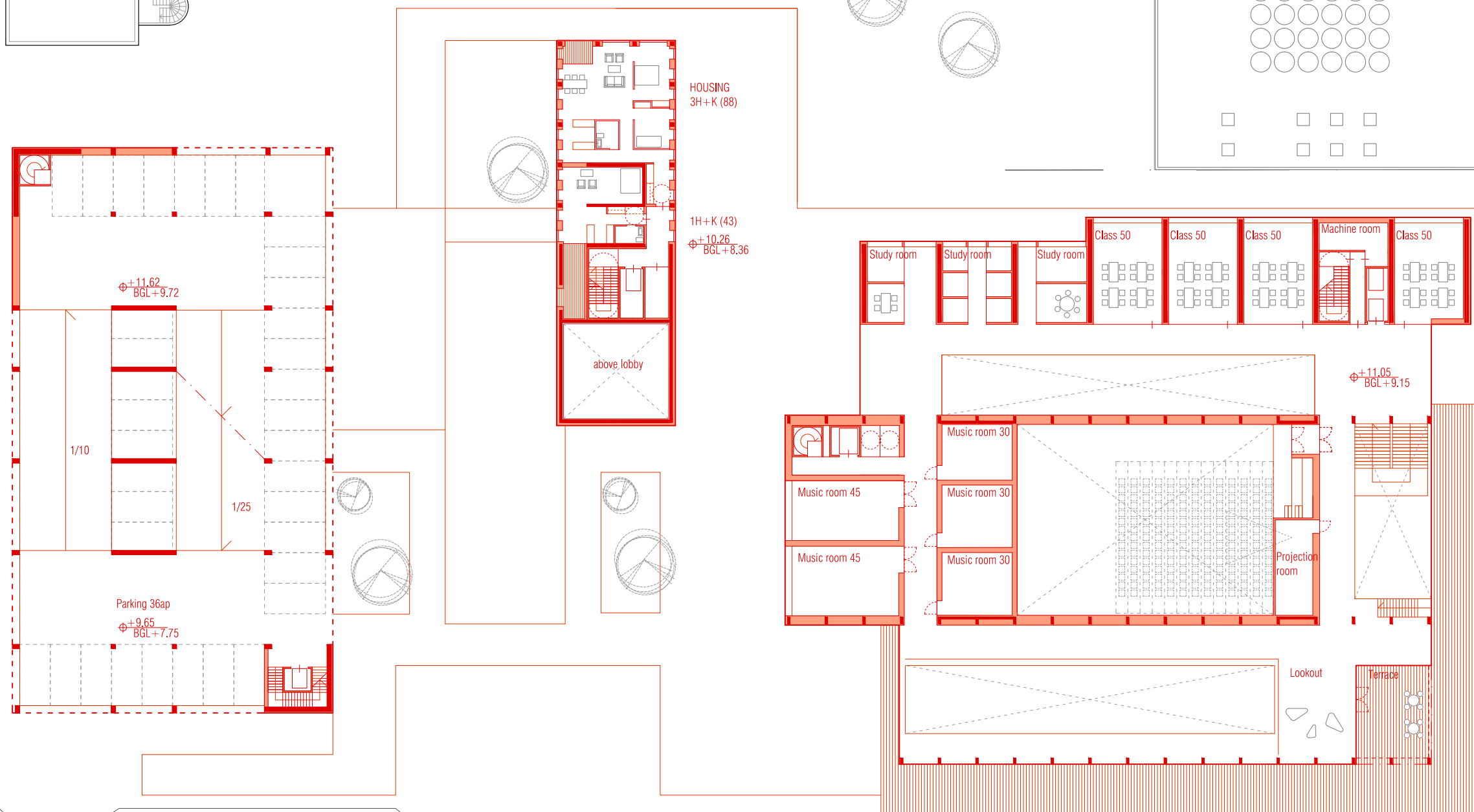




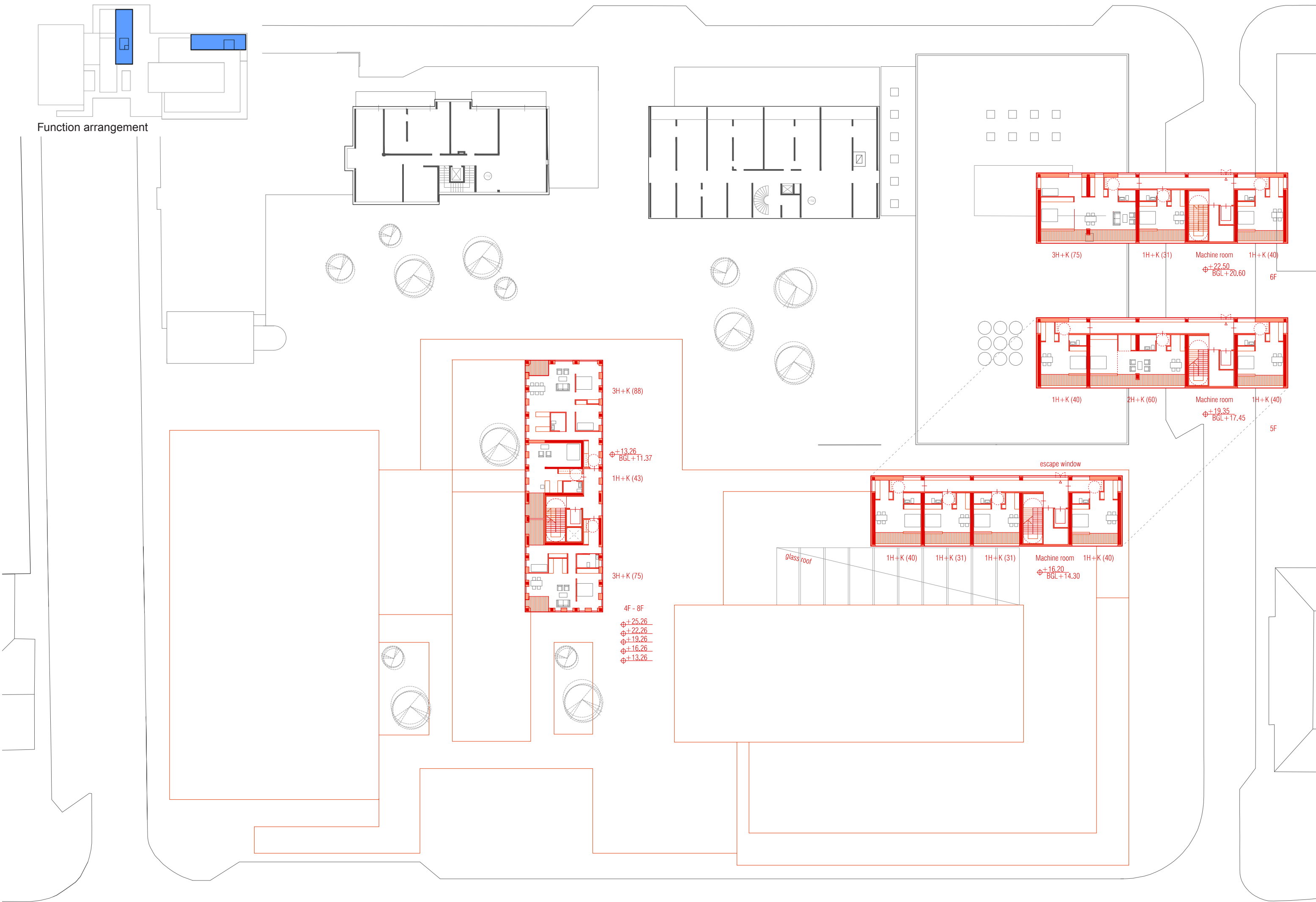
Function arrangement

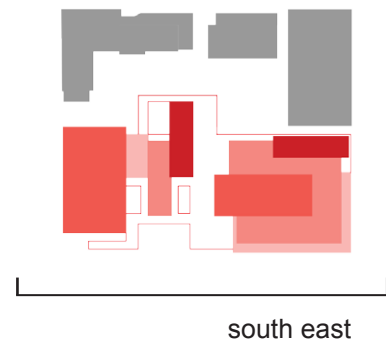


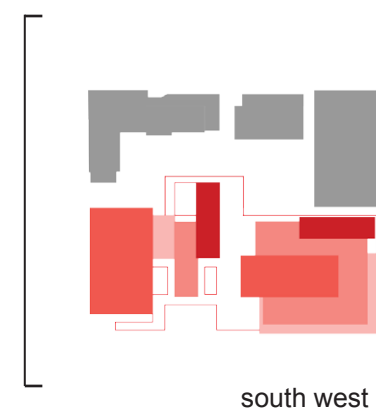
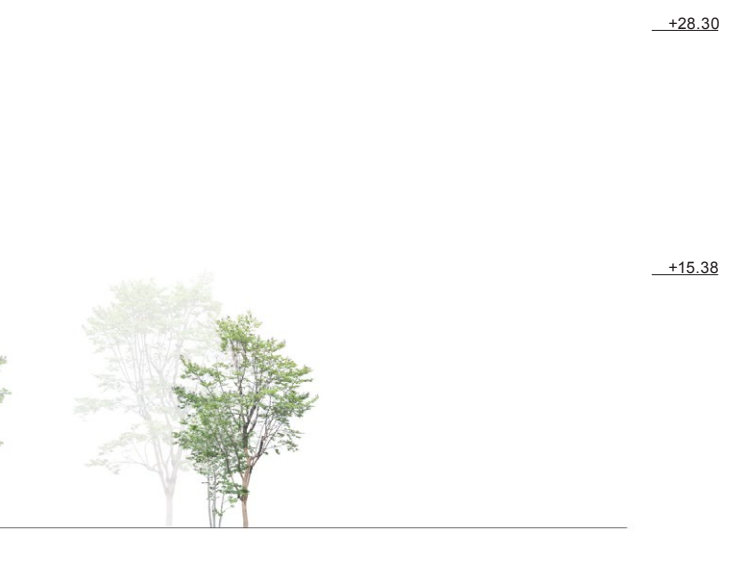
Function arrangement



Function arrangement



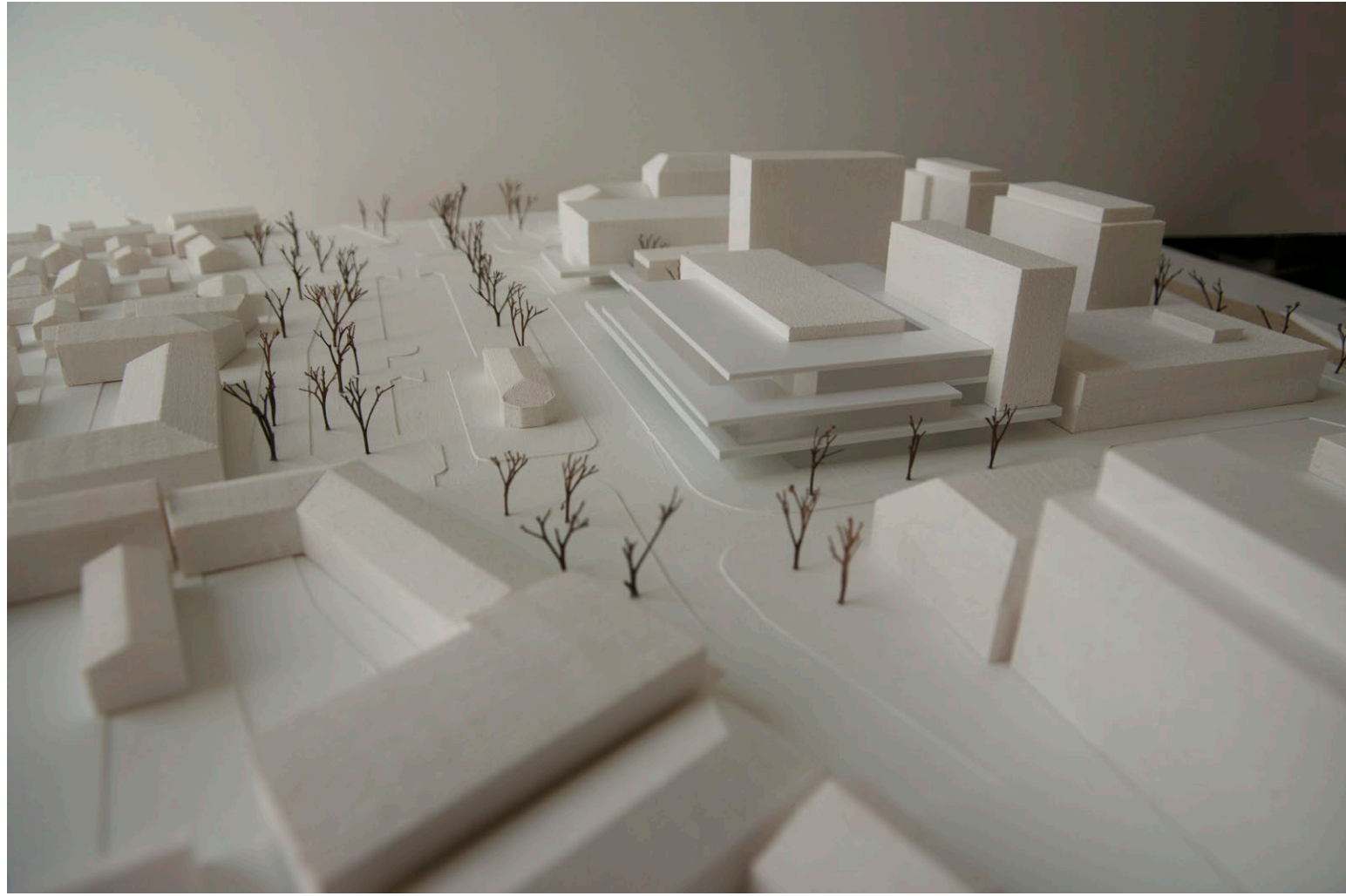
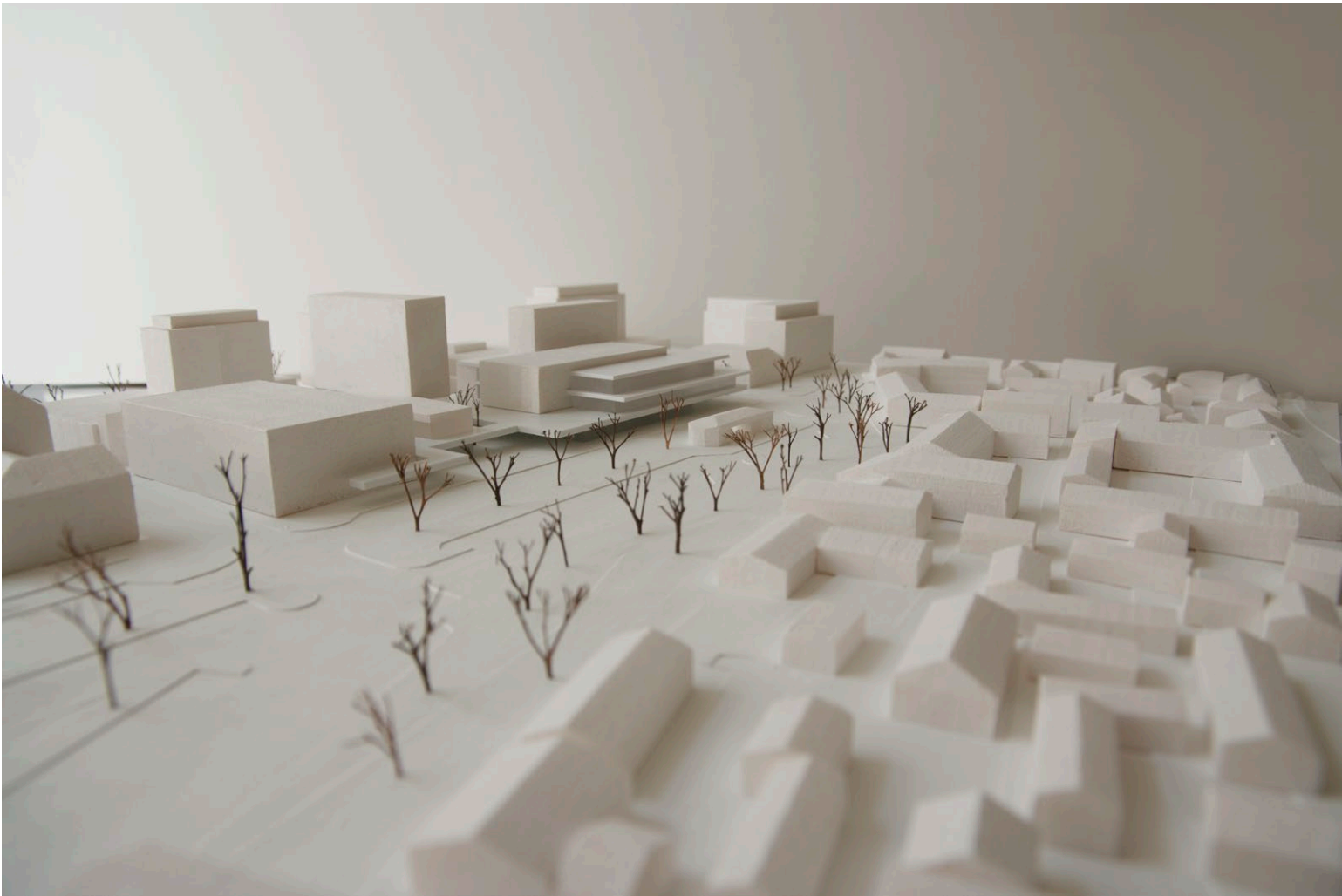








north west







Perspective from Kauppakatu

Main entrance to public and commercial space are set at the corner of Kauppakatu and Savilankatu. Layer of deep eaves is for communication between new building and its surrounding. Flow of Kauppakatu from market square is lead to the entrance under the eaves.



Rauma
Cultural
Center

EILAKAISTA

EILAKAISTA

Koru-Kelot • Timon Kulta • Lahjatavarat

KELLOSEPPÖ
Seppo Pölli

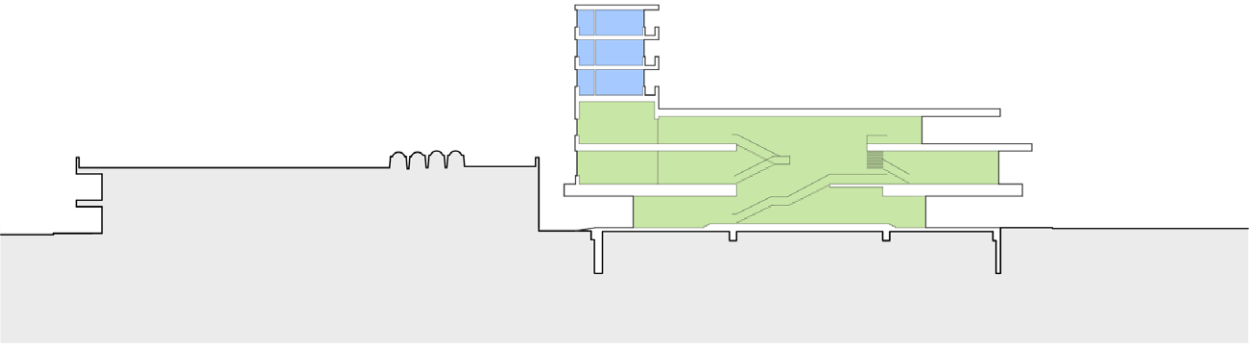
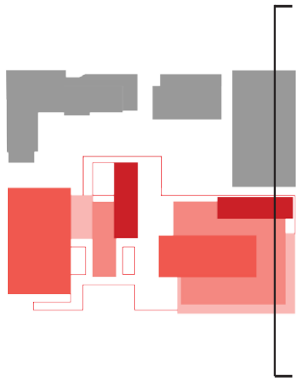


POLAR
HUOLTO

SWISS
WATCHES

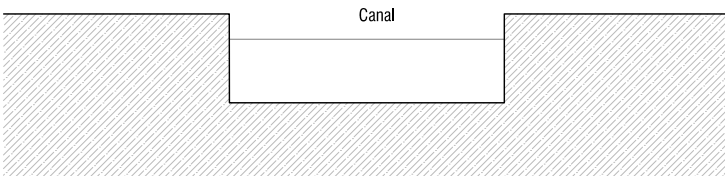
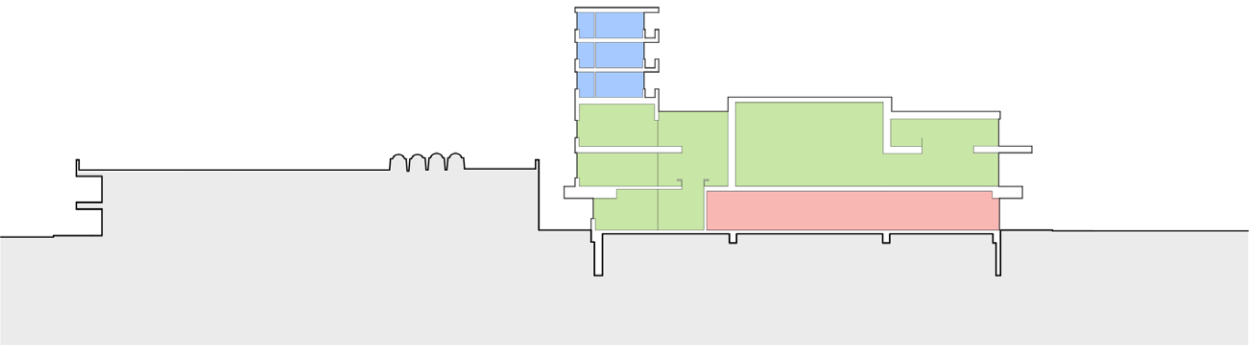
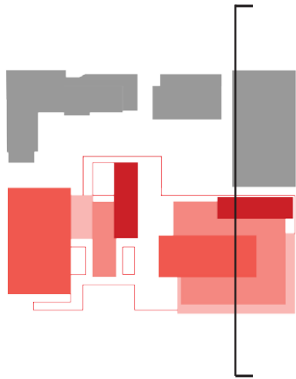
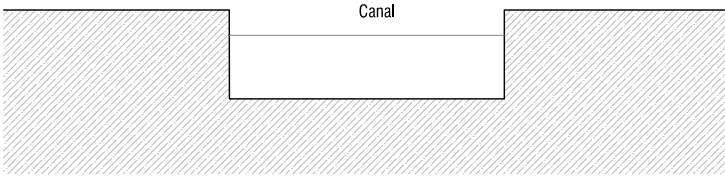
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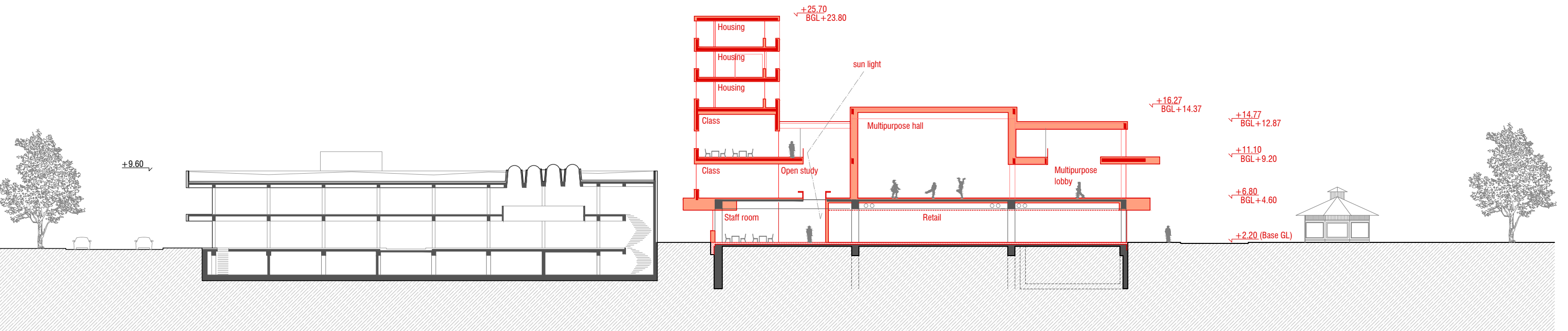
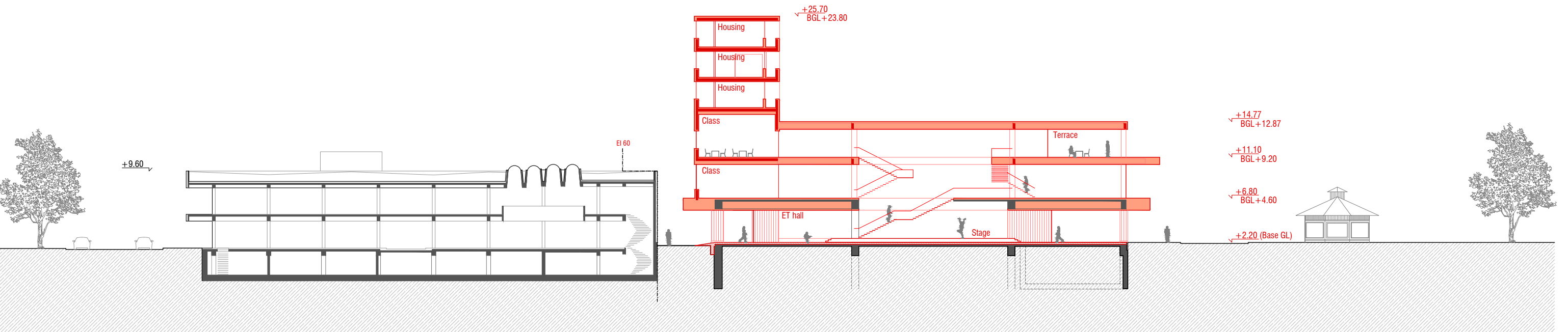
SEQUENCE OF SECTIONAL TRANSITION



Function arrangement

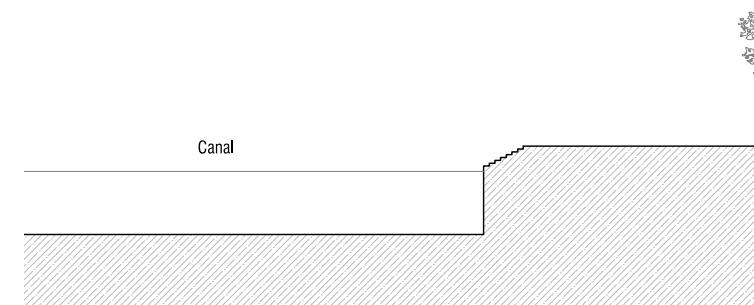
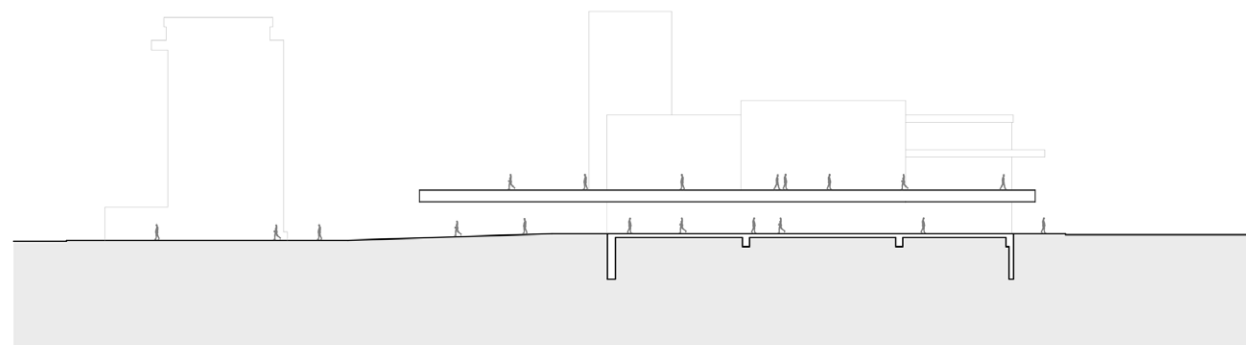
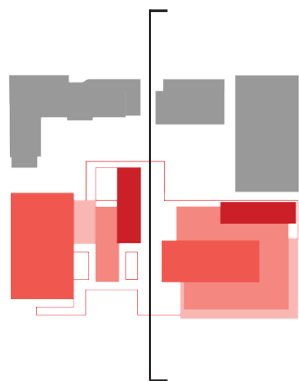
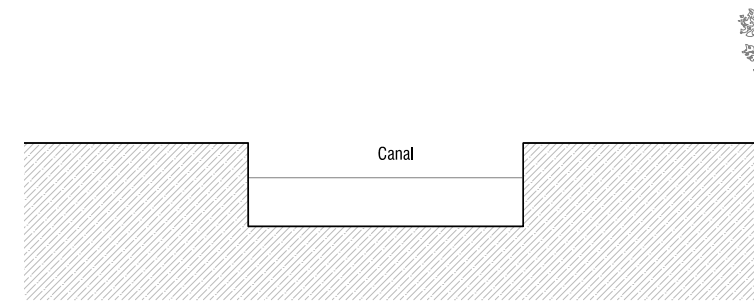
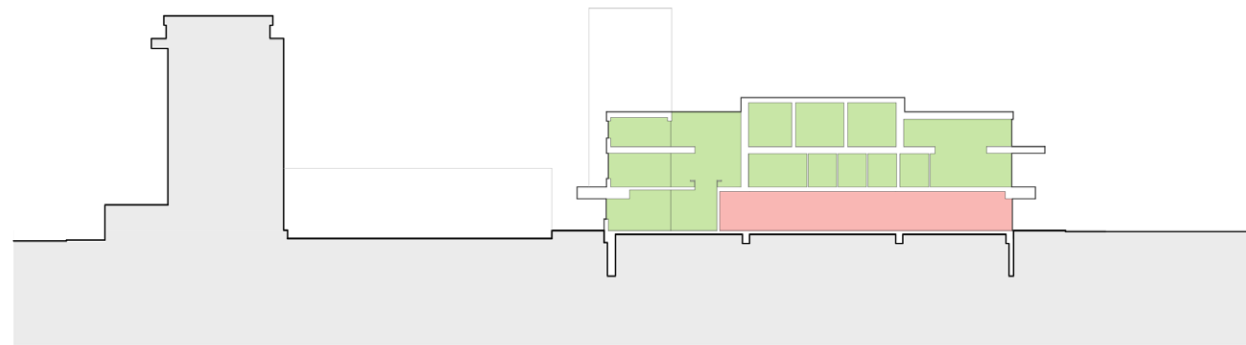
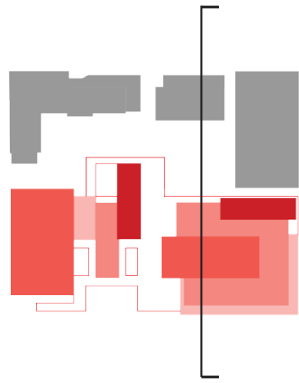
- commercial
- public, cultural
- housing

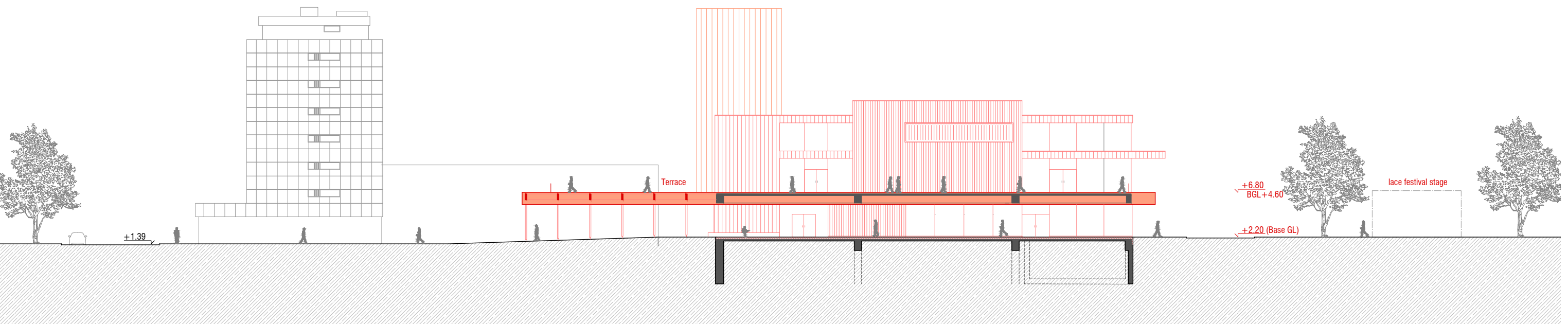
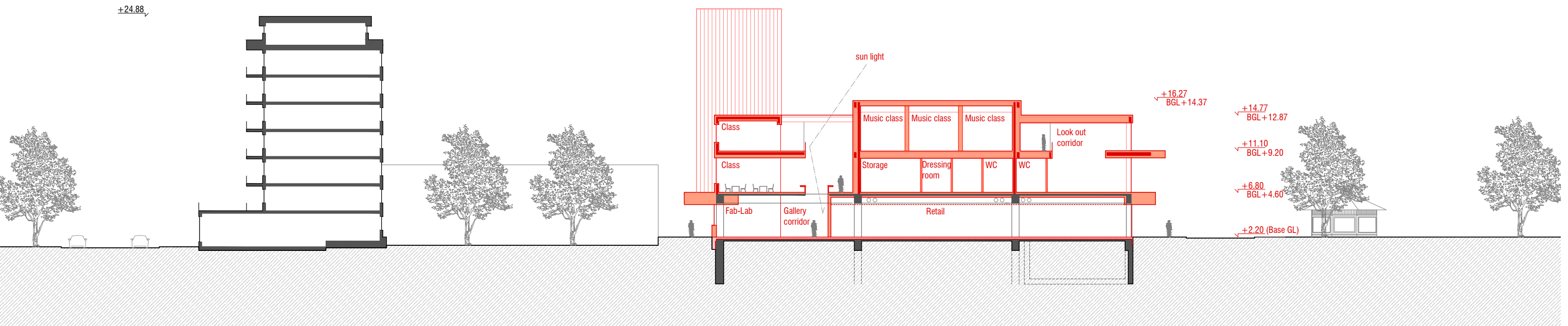




— Extension
— Existing

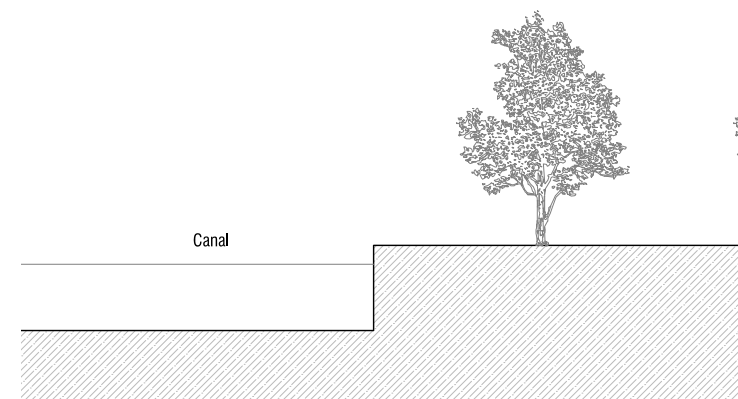
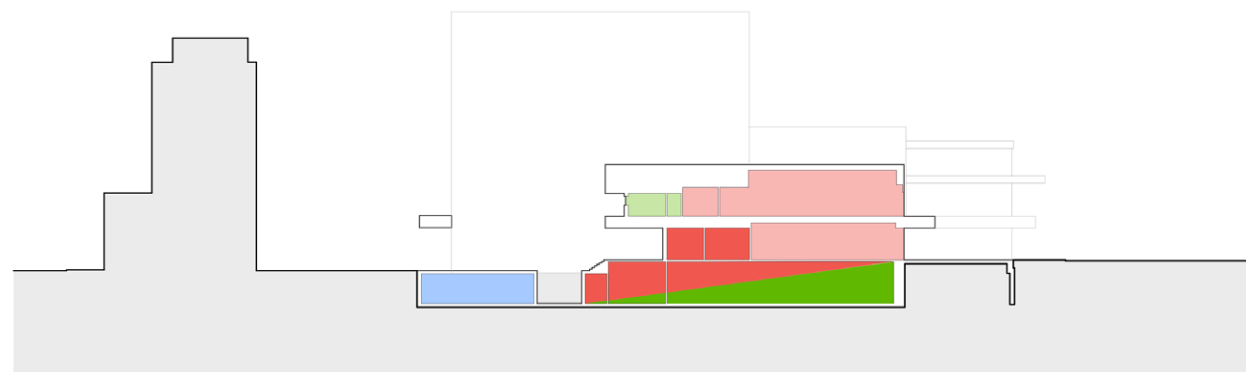
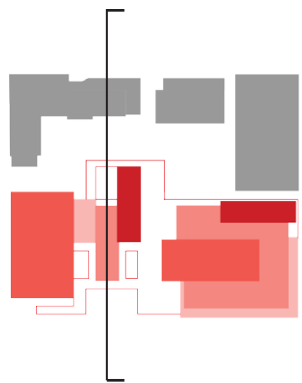
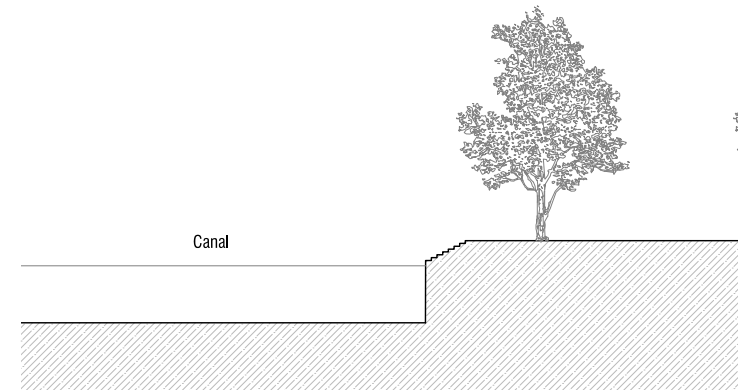
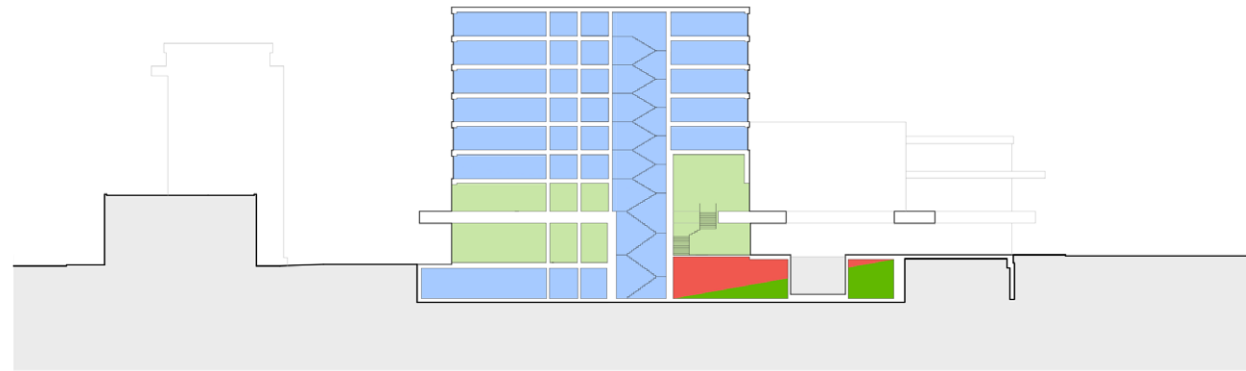
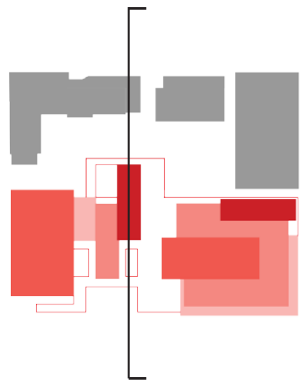
SECTION 1 : 400



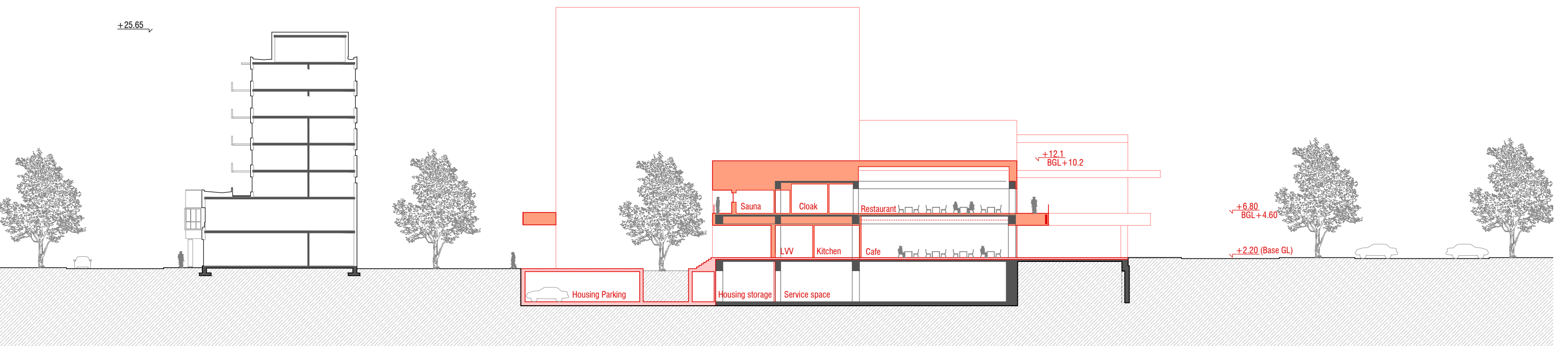
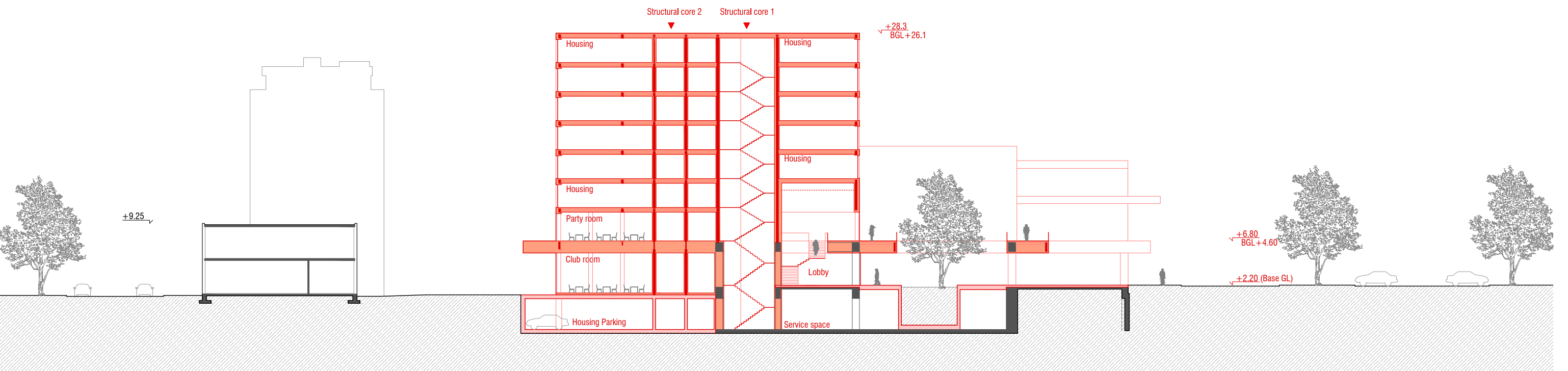


— Extension
— Existing

SECTION 1 : 400

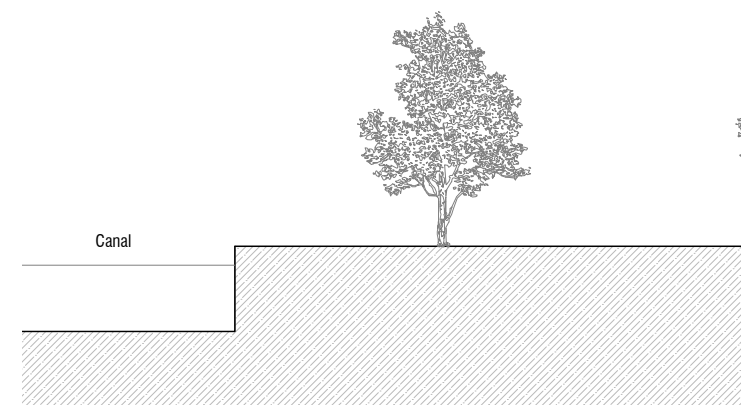
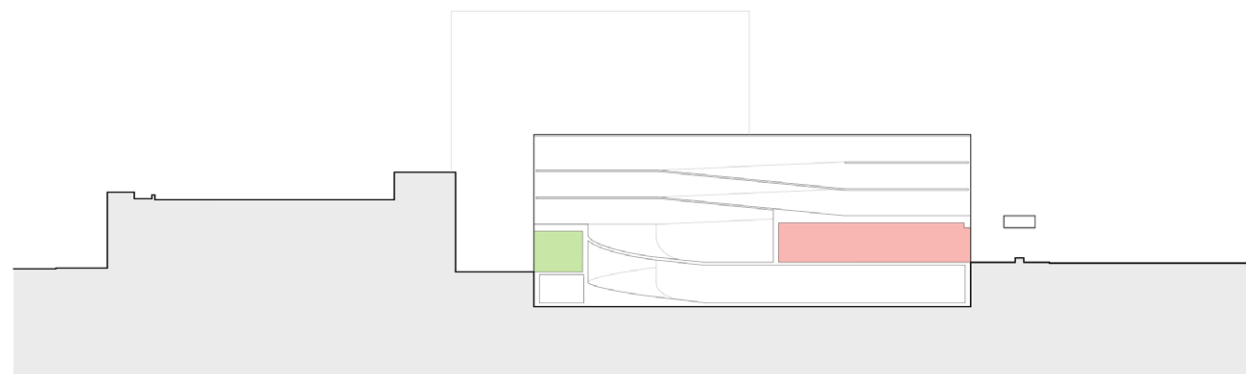
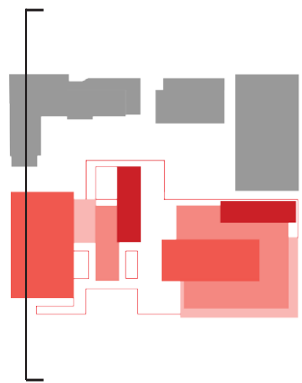
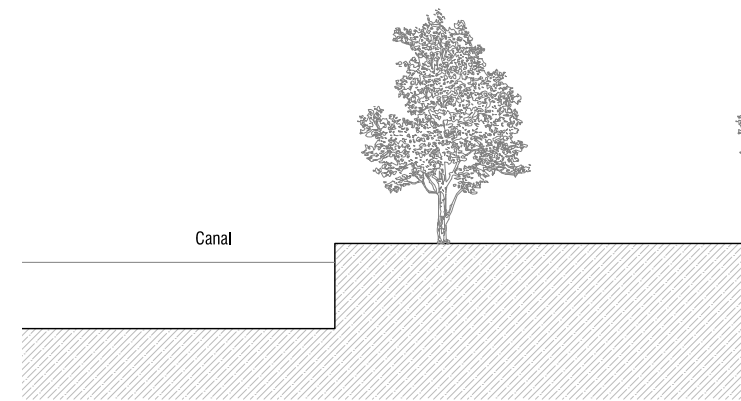
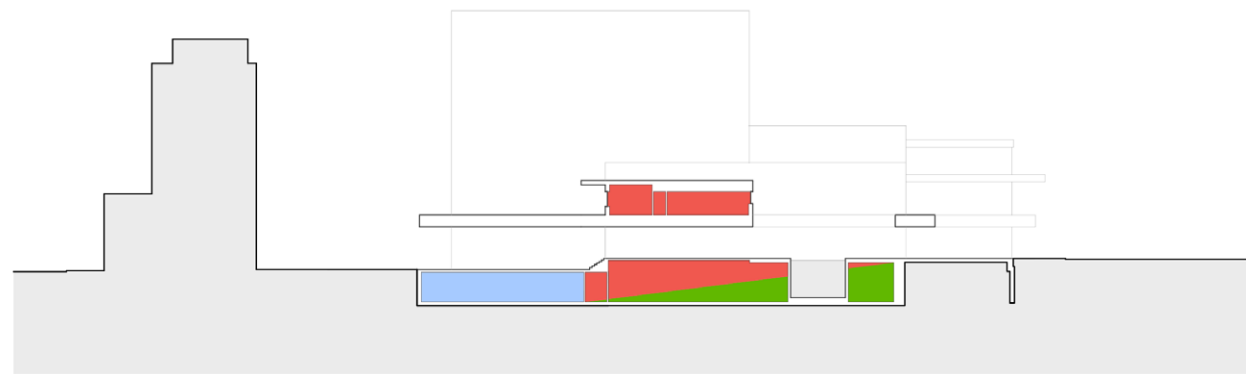
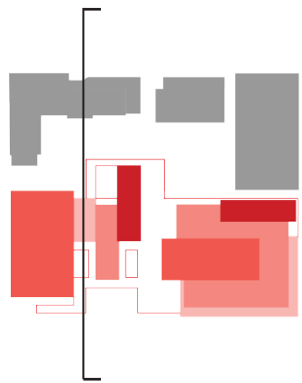


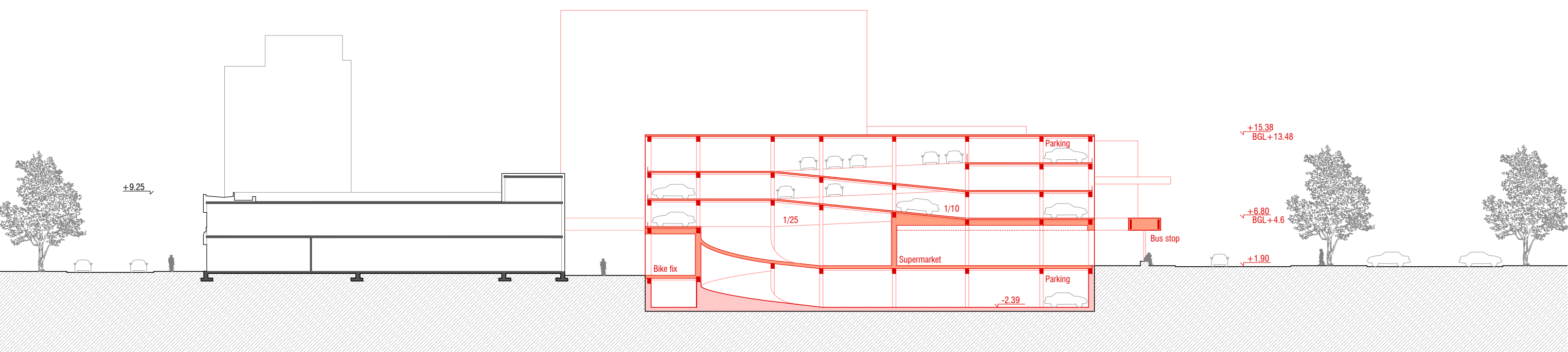
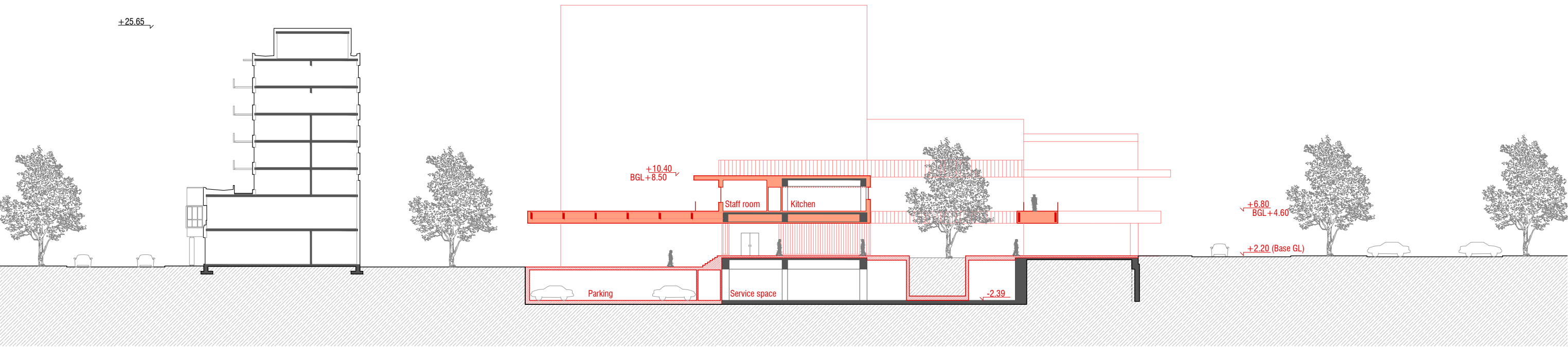
- commercial
- service space for commercial
- public, cultural
- service space for public, cultural
- housing



Extension
Existing

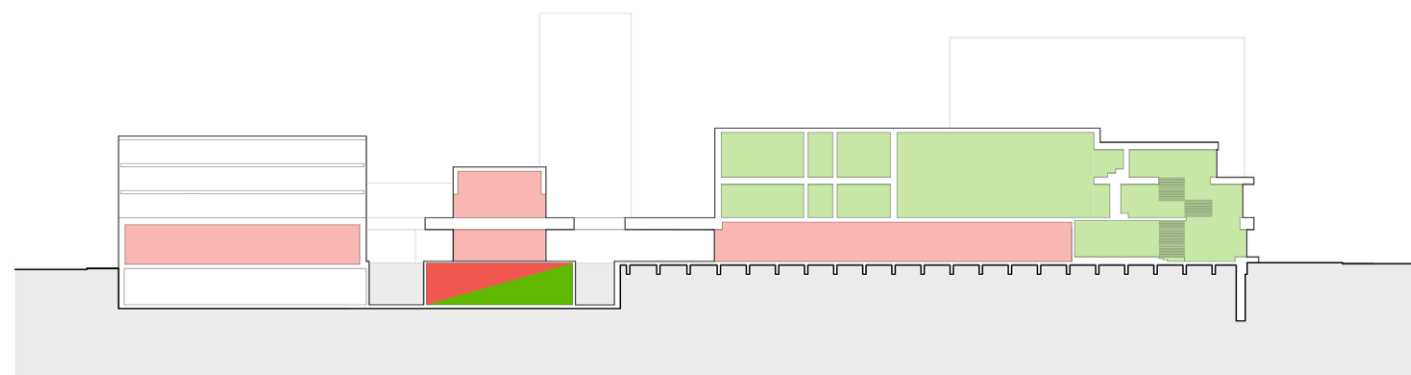
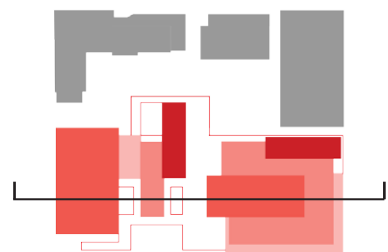
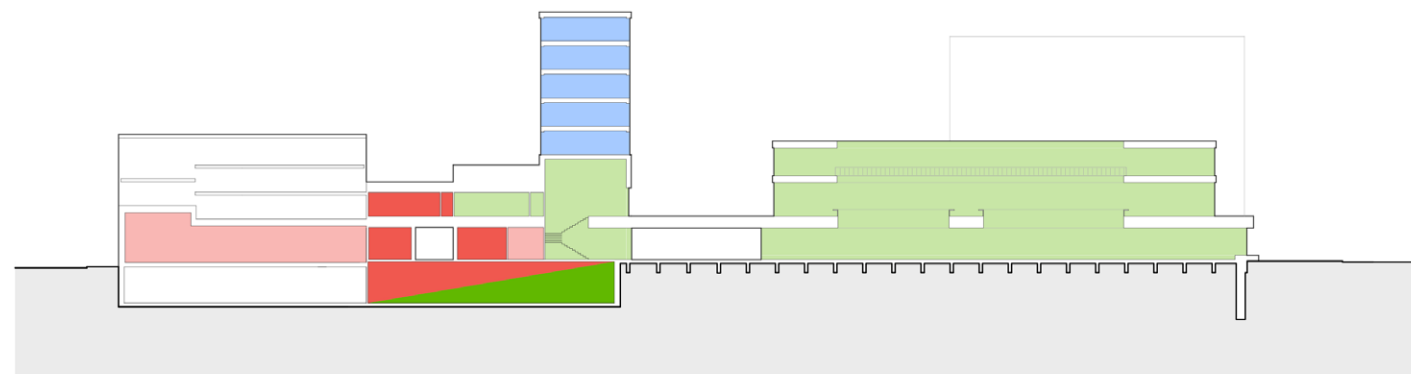
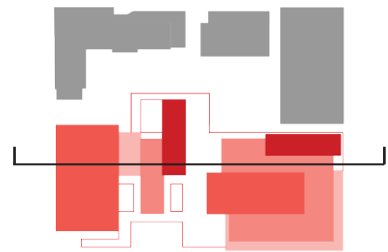
SECTION 1 : 400



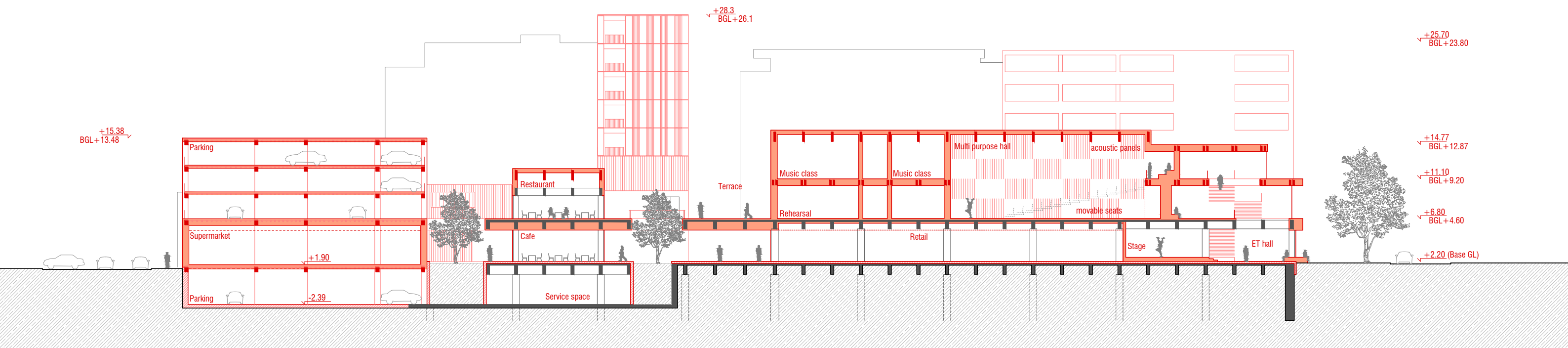
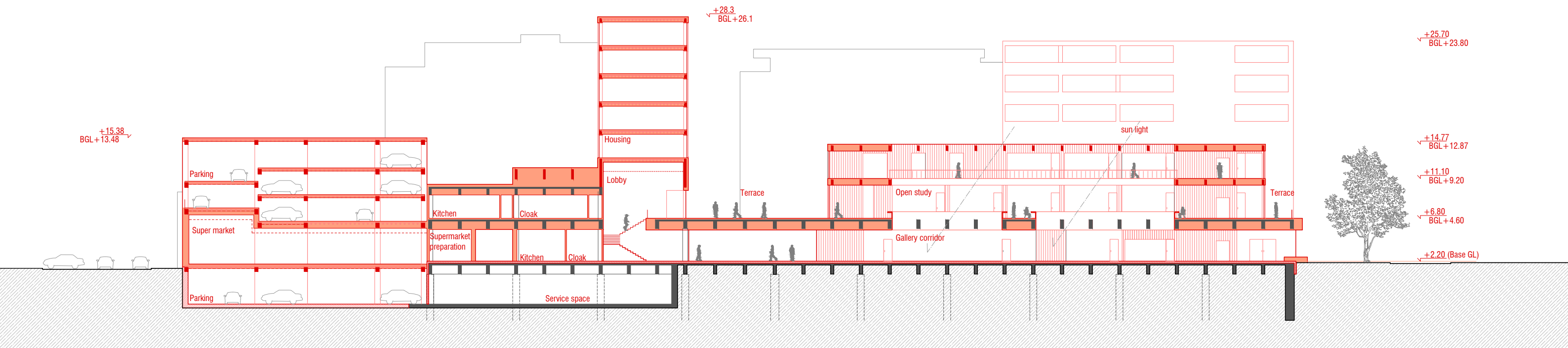


— Extension
— Existing

SECTION 1 : 400



- commercial
- service space for commercial
- public, cultural
- service space for public, cultural
- housing



Extension
Existing

SECTION 1 : 400

Rauma Cultural Center
multi purpose hall



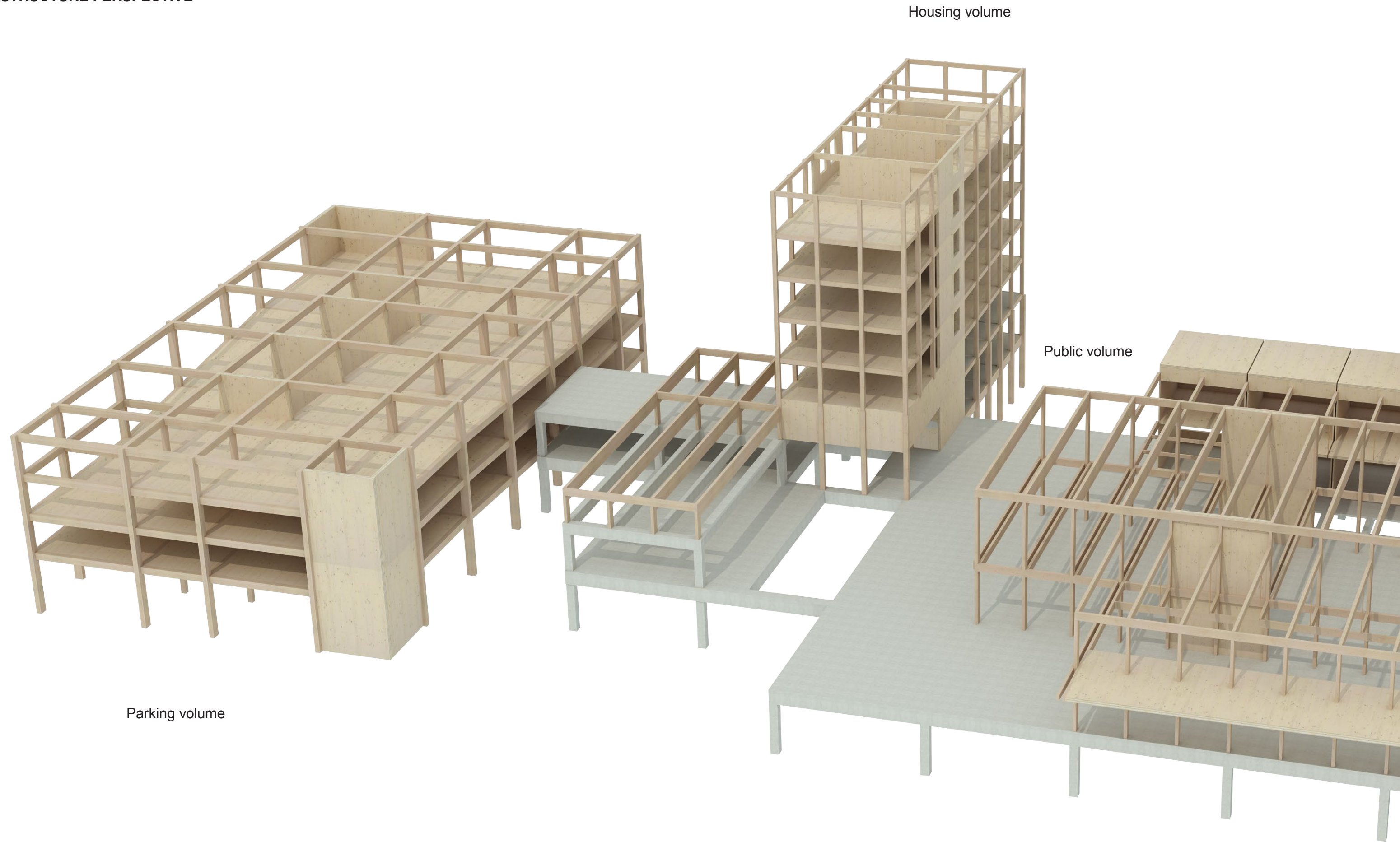


Perspective at multi-purpose lobby

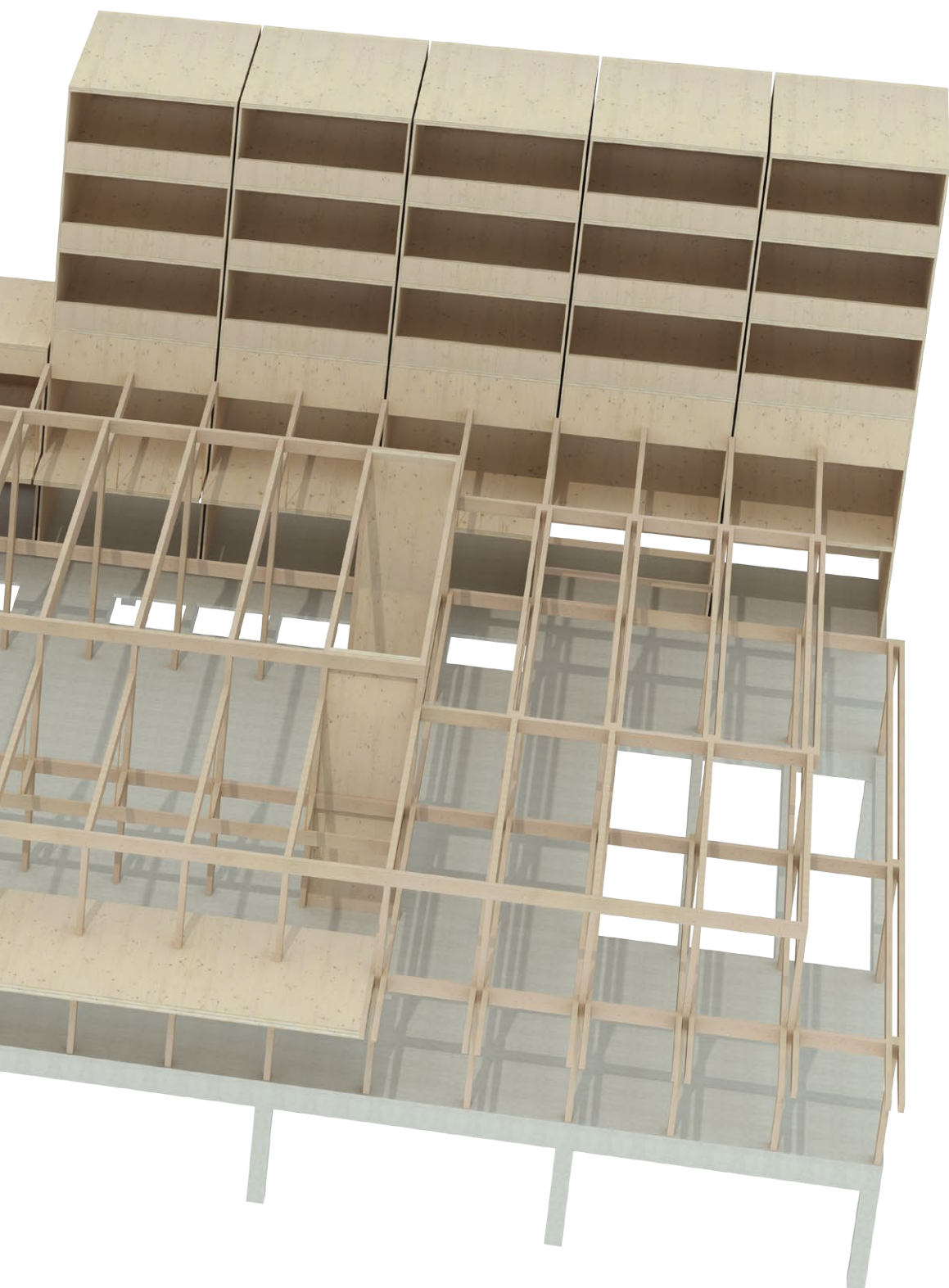
From the multi-purpose lobby, roof scape of the surrounding is seen under the new eave. The new eave of straight make contrast and emphasize undulation of roof of the surrounding.

The space is used in connection with the multi-purpose hall. There is look-out terrace at the corner of third floor.

STRUCTURE PERSPECTIVE



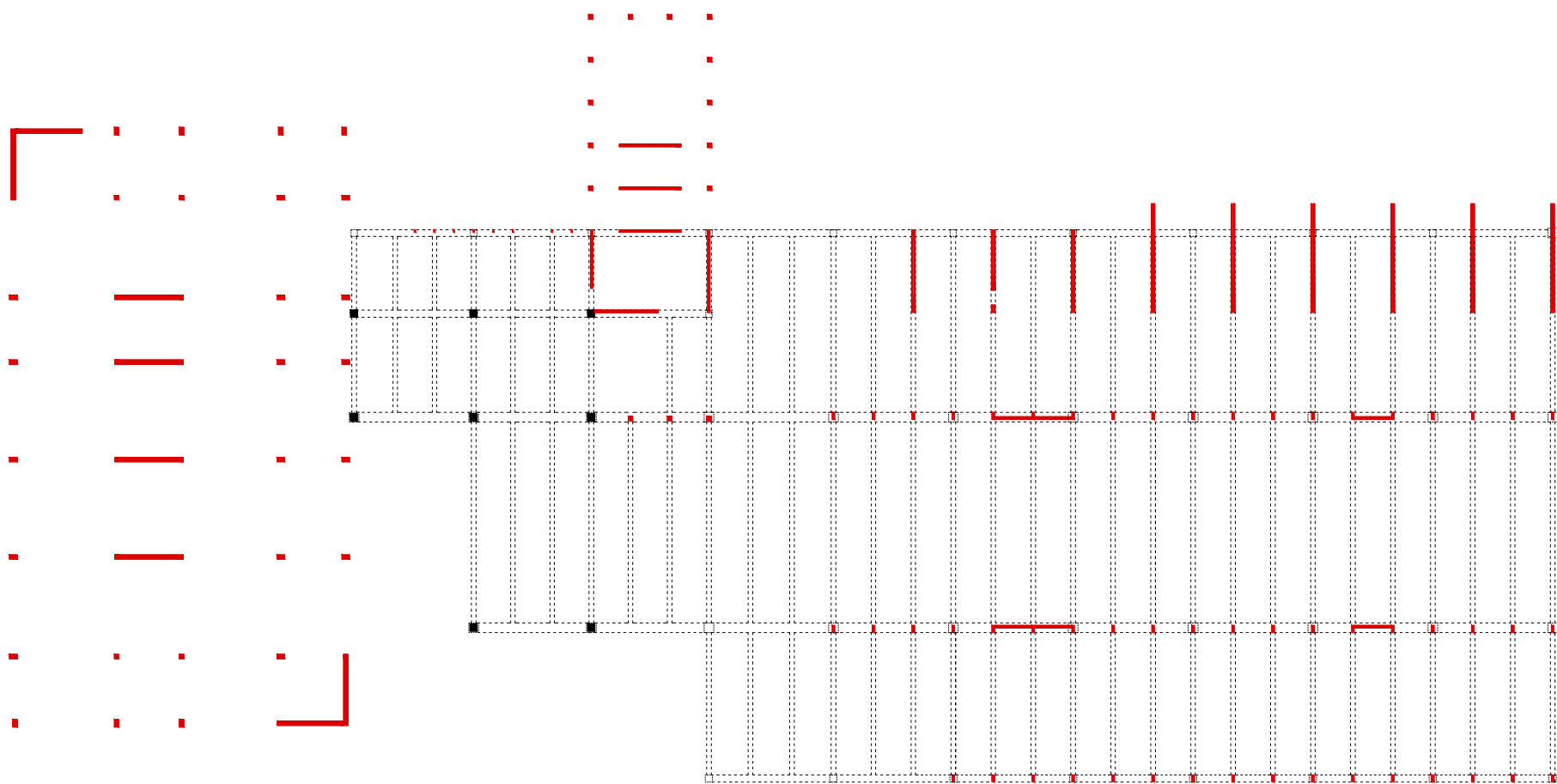
Classroom and housing volume



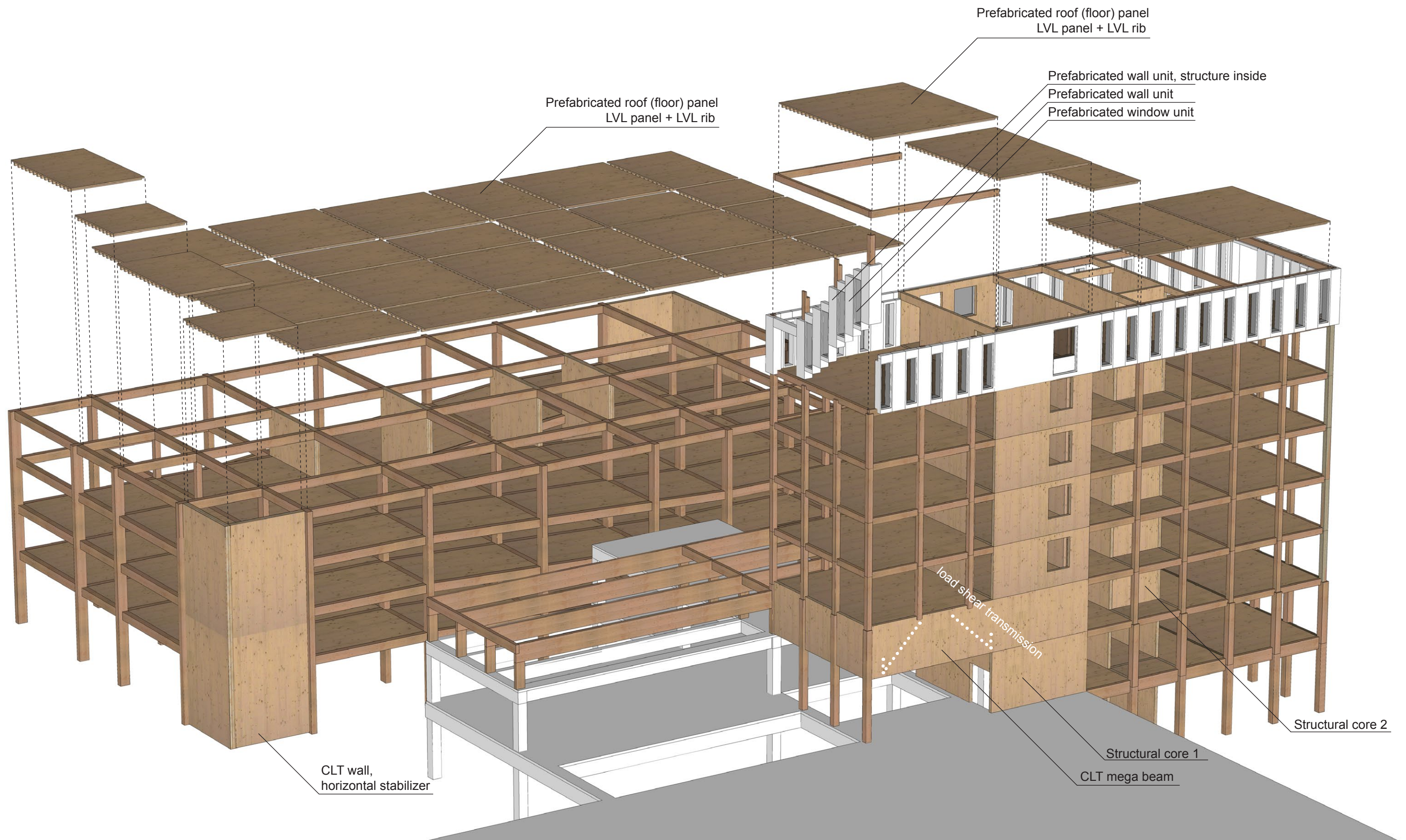
Each volume of the new building was given own structure to achieve structural feasibility on the existing structure and to achieve program required inside.

Parking volume is built with post and beam structure,
Housing volume is built with post and beam around cores of CLT with prefabricated wall elements,
Classroom and housing volume is built with assembling CLT panels,
Public volume is built with reputation of 1000mm height beams to achieve long-span for multipurpose hall.

All new primary structures on the existing structure are set on pillar or primary beam of the existing structure.
All secondary beams of the existing structure are basically free from the new loads.



Arrangement of primary structure on existing structure (2F level)



STRUCTURE DETAIL / Parking volume
Housing volume





Perspective in classroom volume looking down open study space

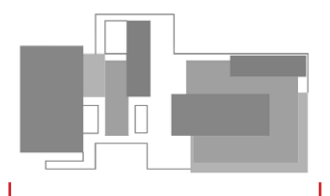
Classrooms on second and third floor are connected through well space. The space is filled with light from glass roof. Floating corridor is supported by cantilevered CLT floor panel and suspension steel rod which is fire-protected with wood.



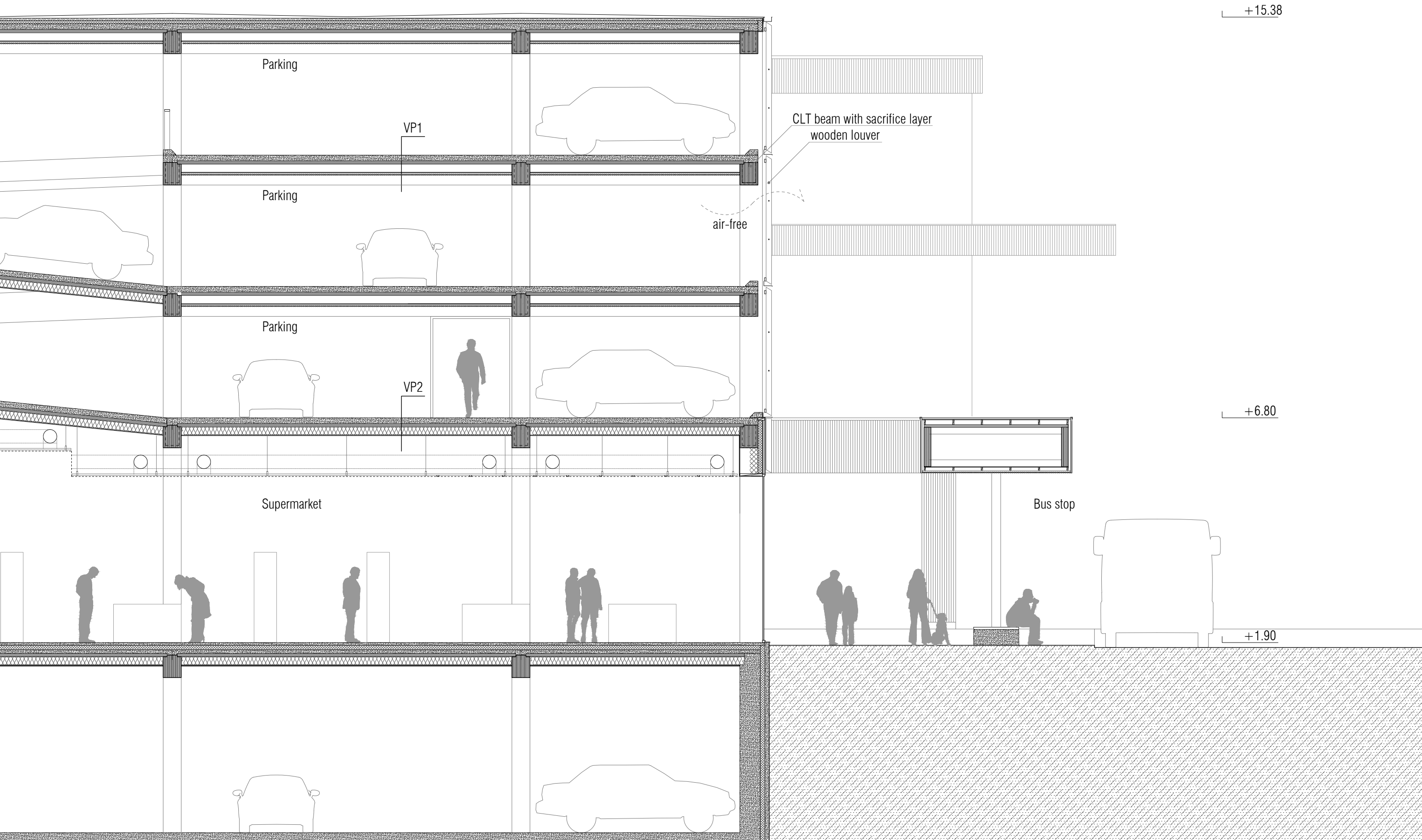


1. Larch vertical boarding,
transparent oil stain finish
2. Silver fir vertical boarding,
transparent oil finish
3. Silver fir vertical louver,
diagonally attached,
translucent black paint finish

4. Silver fir, prefabricated wall element,
transparent oil finish
5. Silver fir, prefabricated window element
transparent oil finish
6. Silver fir vertical boarding,
translucent black paint finish



ELEVATION 1:150



VP1

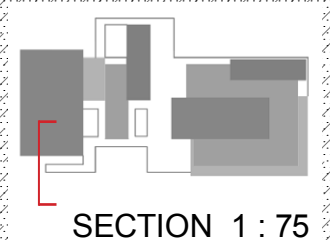
125 mm Screed
75 mm LVL panel
180 mm LVL rib
15 mm Gypsumboard
30 mm Furring
25 mm Wooden strip ceiling

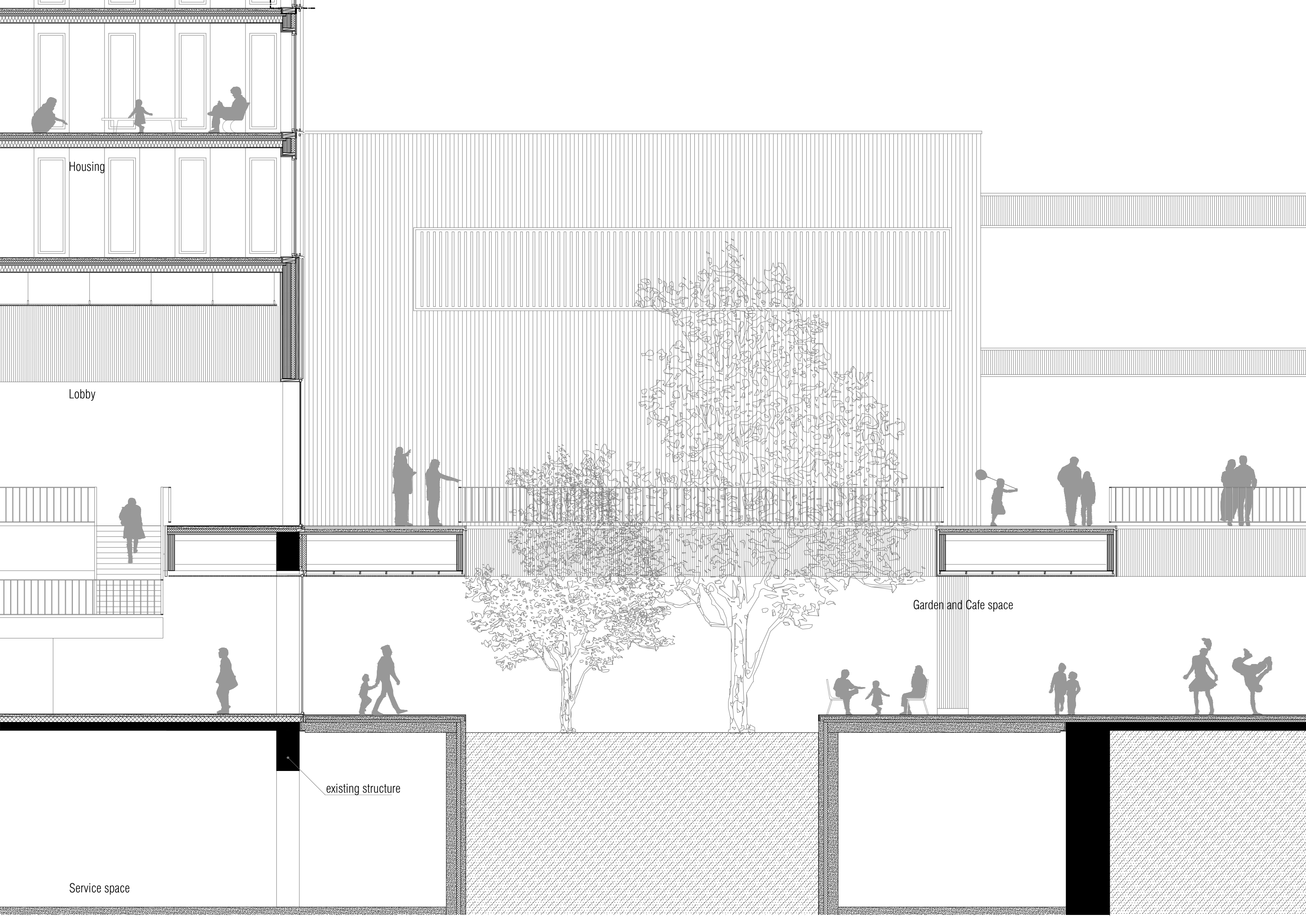
VP2

125 mm Screed
75 mm LVL panel
180 mm LVL rib
180 mm Insulation
15mm Gypsumboard
Pipe space
2mm Steel mesh ceiling



Parking /
Stage in Lace Festival





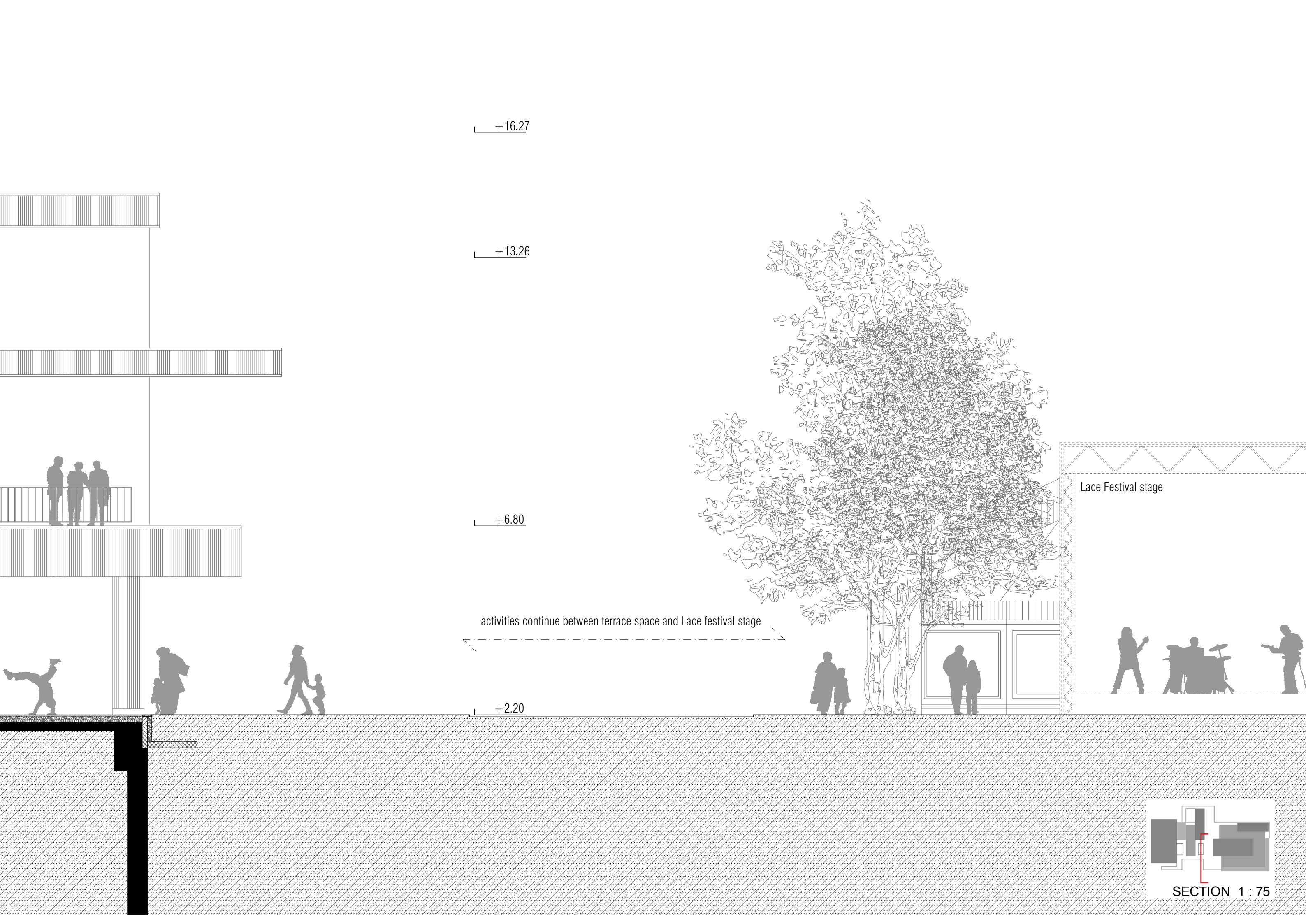
Housing

Lobby

Service space

existing structure

Garden and Cafe space



+16.27

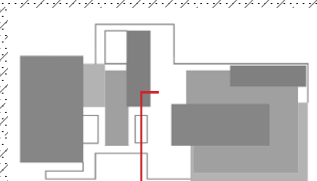
+13.26

+6.80

+2.20

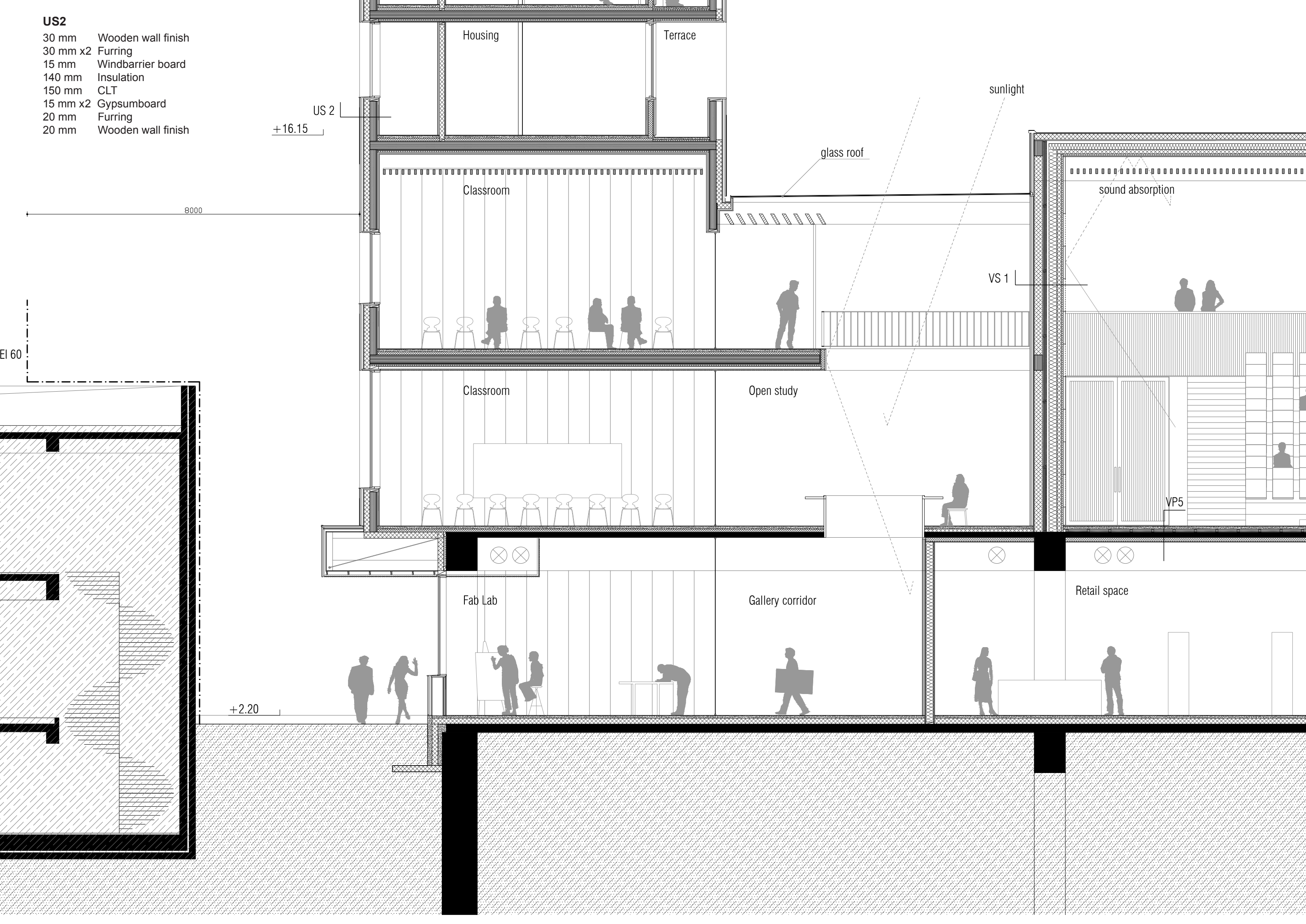
activities continue between terrace space and Lace festival stage

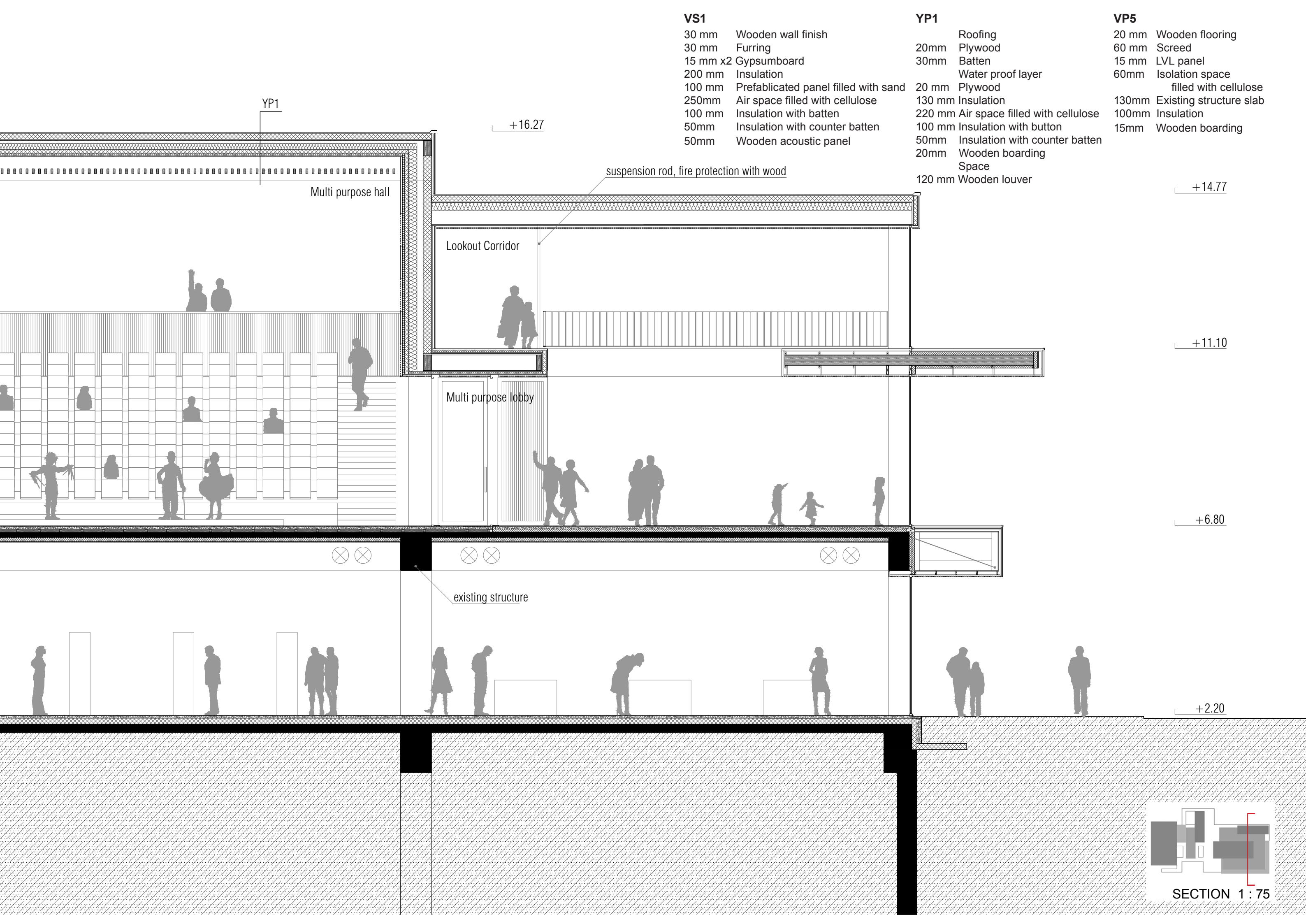
Lace Festival stage

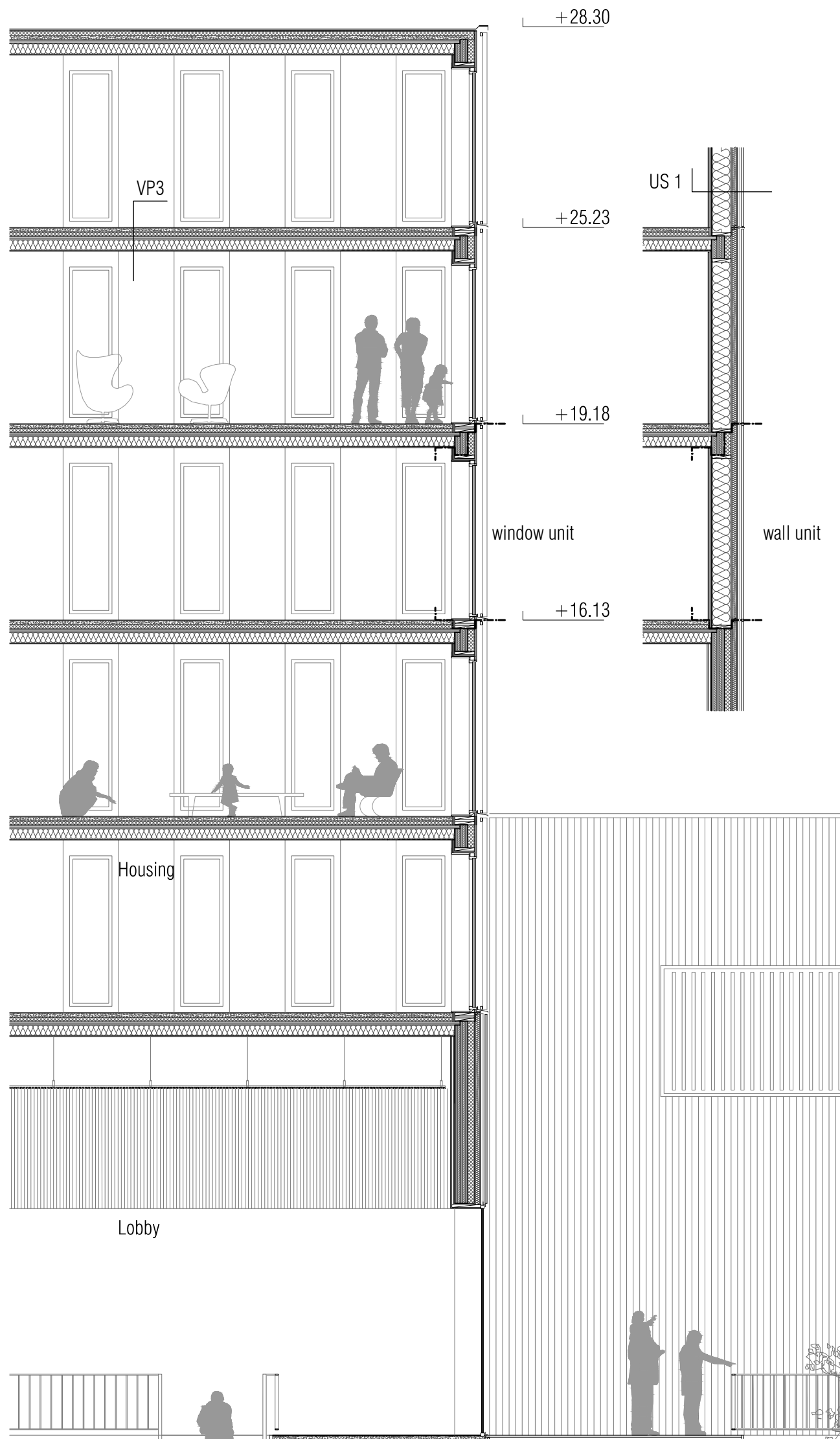


SECTION 1 : 75

- US2**
- 30 mm Wooden wall finish
 - 30 mm x2 Furring
 - 15 mm Windbarrier board
 - 140 mm Insulation
 - 150 mm CLT
 - 15 mm x2 Gypsumboard
 - 20 mm Furring
 - 20 mm Wooden wall finish







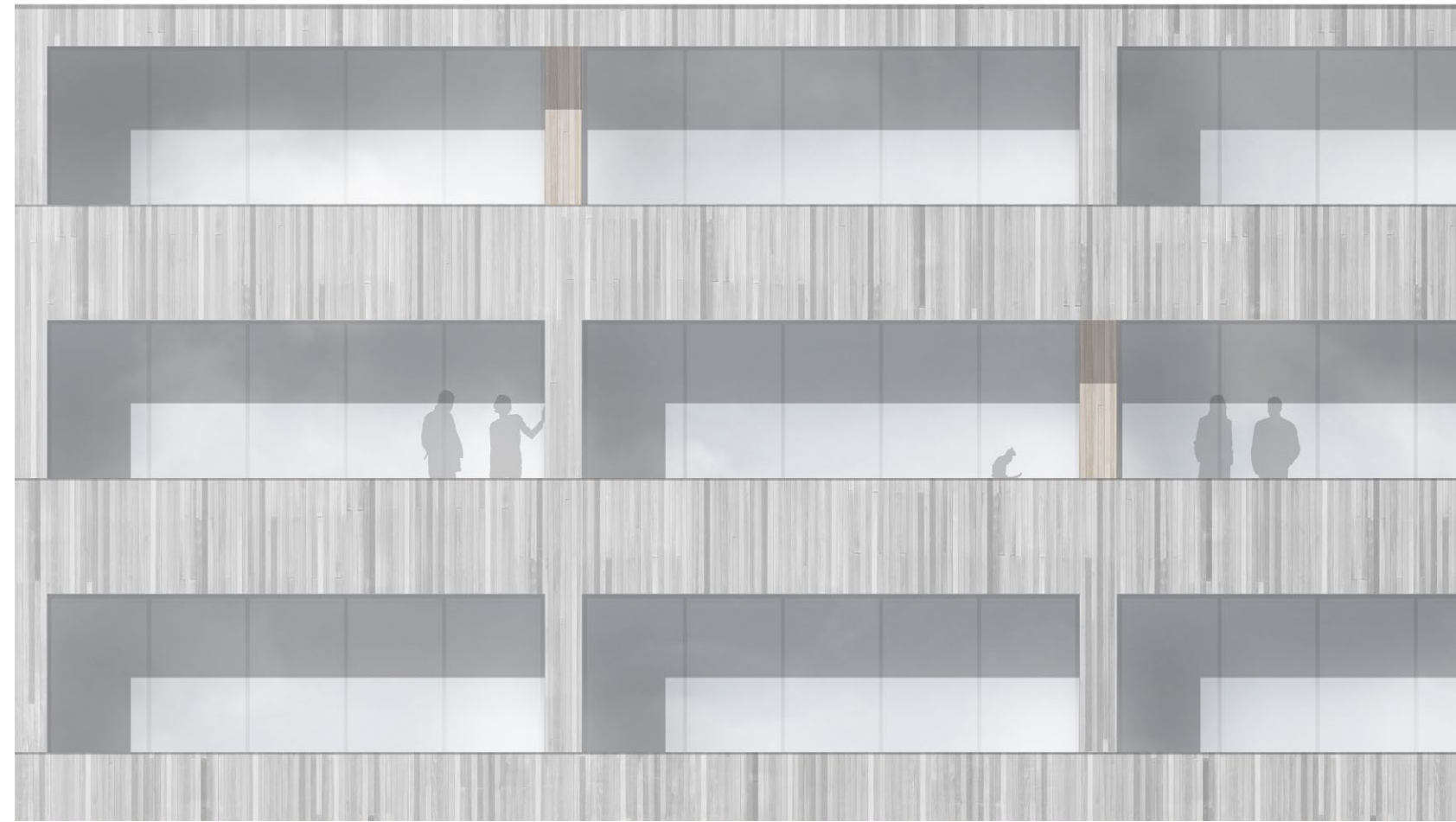
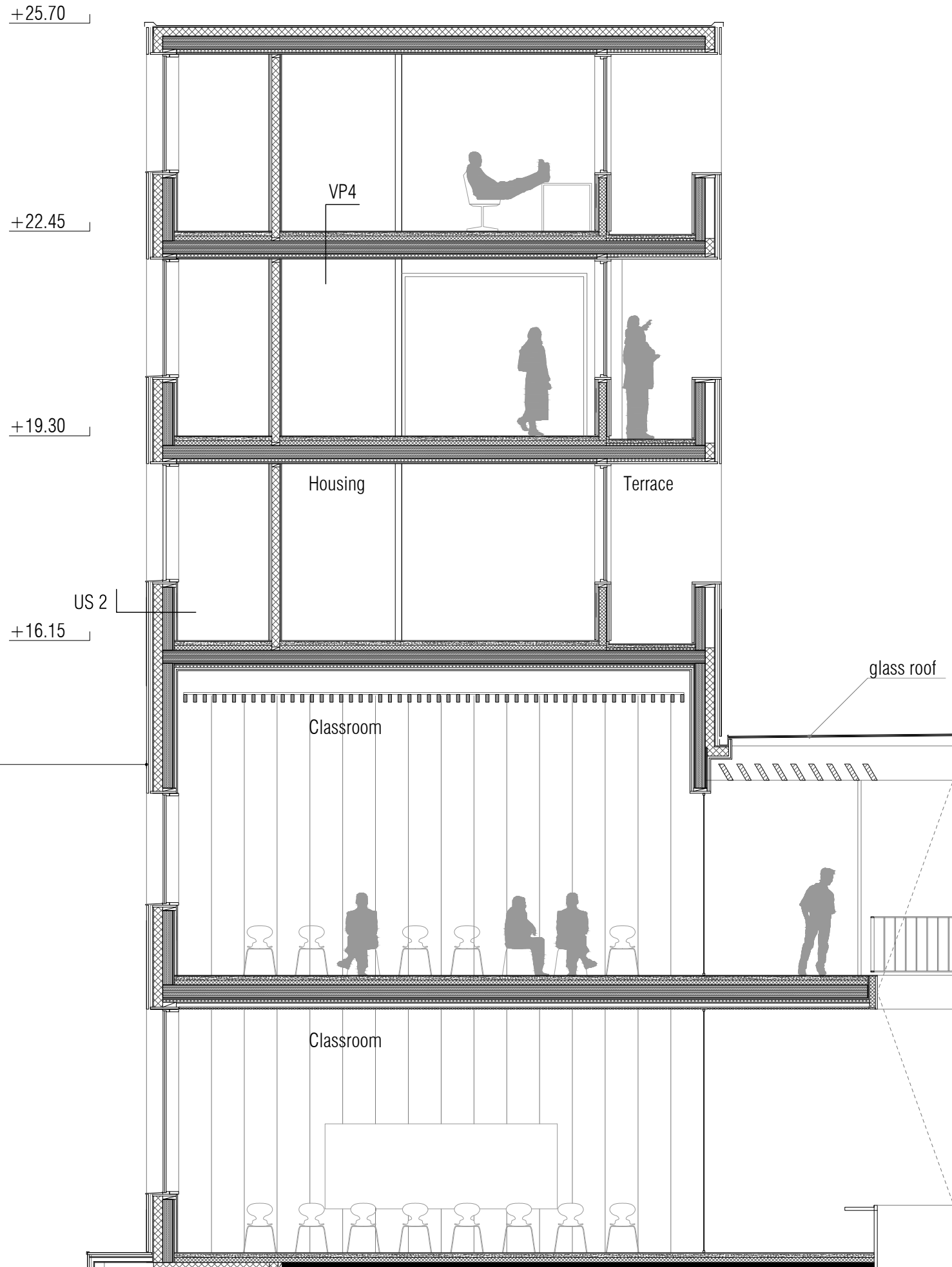
US1

- 20 mm Wooden wall finish
- 20 mm Furring
- 15 mm Gypsumboard
- (200 mm CLT beam)
- 100 mm Insulation
- 15 mm Gypsumboard
- 60 mm Insulation
- 15 mm Windbarrier board
- 35 mm x2 Furring
- 30 mm Wooden wall finish

VP3

- 10 mm Wooden flooring
- 60 mm Screed
- 60 mm Insulation
- 60 mm LVL panel
- 160 mm LVL rib
- 160 mm Insulation
- 15 mm Gypsumboard





US2

30 mm Wooden wall finish
 30 mm x2 Furring
 15 mm Windbarrier board
 140 mm Insulation
 150 mm CLT
 15 mm x2 Gypsumboard
 20 mm Furring
 20 mm Wooden wall finish

VP4

10 mm Wooden flooring
 60 mm Screed
 75 mm Insulation
 200 mm CLT
 50 mm Insulation
 15mm x2 Gypsumboard

BUILDING INFORMATION

EXISTING PROGRAMS IN PLOT 22 + 8		NEW PROGRAMS	
Commercial space	3200 m2	Commercial space	2571 m2
Service and office space	1400 m2	Public space	4349 m2
Parking space	160 ap	Housing space	2627 m2
		1H + K (43m2) x6	
		3H + K (88m2) x6	
		3H + K (75m2) x5	
		in 8 storey volume	
		1H + K (40m2) x5	
		1H + K (31m2) x3	
		2H + K (60m2) x1	
		3H + K (75m2) x1	
		in 6 storey volume	
		Service space	650 m2
		Parking space	4714 m2 (154ap)
TOTAL		TOTAL	10197 m2
	4600 m2		+ parking 154ap (4714 m2)
	+ parking 160ap		
		INCREASE	5597m2

This thesis work includes:

- 14 A1 presentation panels
- 1 1/400 scale model

RESOURCES

Building Conversion & Renovation
/ Arian Mostaedi

BUILDING WITH TIMBER PATHS INTO THE FUTURE
/ Hermann Kaufmann, Winfried Nerdinger

DETAIL
Review of Architecture Vol.4, 2005 Refurbishment

DETAIL JAPAN
Review of Architecture Vol.2, 2007 Timber Construction

do co mo mo
Wood and Modern Movement
/HELSINKI UNIVERSITY OF TECHNOLOGY LIFELONG LEARNING INSTITUTE DIPOLI

HERMANN KAUFMANN WOOD WORKS
/ Otto Kapfinger

RAKENNUSPERINTÖ JA PAIKALLISUUS
Ajallinen Kerrostuma suunnittelun lähtökohtana Raumalla
/ Sirkka köykkä

RAUMAN YLEISKAAVA 1969

Systems in Timber Engineering
/ Josef Kolb

Suomalaisia puukaupunkeja
Hoito, kaavoitus ja suojelu
/ Elisa El Harouny, Olli-Pekka Riipinen, Kaija Santaholma, Timo Tuomi

THE CASE FOR Tall Wood BUILDINGS
How Mass Timber Offers a Safe, Economical, and Environmentally Friendly Alternative for Tall Building Structure
/ mgb ARCHITECTURE + DESIGN, Equilibrium Consulting, LMDG Ltd, BTY Group

Vanha Rauma Old Rauma
/ RAUMAN MUSEO 1992

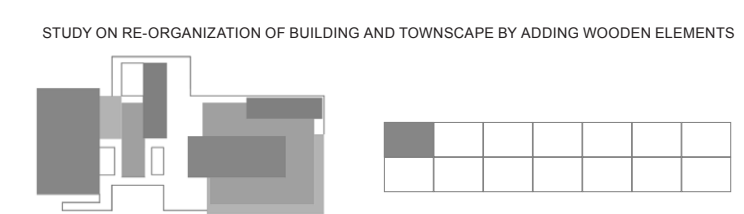
THESIS ACKNOWLEDGEMENT

I would like to express my sincere gratitude to

Professor Pekka Heikkinen
Professor Hannu Hirsi
Samuli Miettinen / JKMM Architects
Henri Raitio / Rauma town planning architect

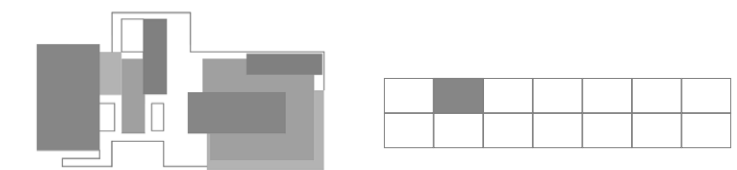
and
Huttunen-Lipasti-Pakkanen Architects

I also would like to thank my family, friends and Anna Grönlund.



STUDY ON RE-ORGANIZATION OF BUILDING AND TOWNSCAPE BY ADDING WOODEN ELEMENTS



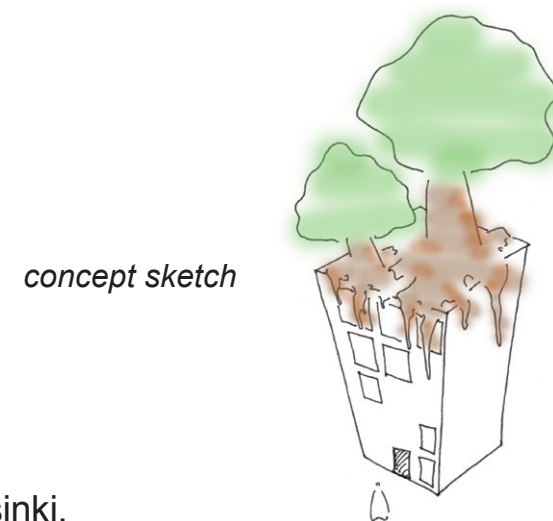


THEME OF THE PROJECT

This project is a study about how to re-organize and improve existing building and townscape or cityscape by way of adding wooden elements.

Wood as architectural construction material has three outstanding characteristics, its light weight in comparison of strength, its thermal capacity and its variety in structural form. These characteristics indicate superiority of wooden construction in extension construction. Because, wooden construction can be built on existing structure more easily for its light weight, can be built on existing structure without cold bridge for its thermal capacity, can be built on existing structure in any structural form according to existing structure for its variety in structural form.

In today's situation that cities are already full of existing buildings, to find better solution, more green and more effective solution for re-organizing existing building and cityscape to fit to new needs of city is inevitable. This project is a case study to find such solution in addition of wooden elements.



SITE

Site was chosen in Rauma which is 250km north from Helsinki.

Rauma has two different areas, the one is Old Rauma which is the area of remained old wooden buildings registered in UNESCO World Heritage in 1991, and the other is the area built with newer way. The site is on the border of the two in newer side.

In the thesis part, analysis of the area and the existing building in the site was done. First, the analysis revealed that the site which is at the border of old and new part of the town is at the same time border of "organic and straight scape", "small and big building scale", "wood and concrete building material", "commercial and cultural city function" and "border of two green spaces". The goal of design was set to connect and buffer these differences.

Secondly, the functional analysis revealed program requirement for the project. The town planning office expected keeping existing commercial and parking function, and wished new housing and middle-scale hall for events. Music school and adult education center nearby the site has been in shortage of class rooms. As a result it was decided to design project as hybrid building of commercial, public, educational, housing and parking.

EXISTING BUILDING

The project site is in a block of 5 plots, all buildings in the block were built after late 20th century. Out of those plots, two plots were chosen as the project site. One is the plot along Savilankatu, and another one is the plot at the center of the block.

The Building in the plot along Savilankatu is large flat single storey building used for shopping center. Partly there is 2nd floor for office use. Roof space of the shopping center is used for parking. There is small space at under ground level as well.

The structure is concrete, its basic pillar size is huge 750 x 750 mm, primary beam size is 950 x 750 mm, secondary beam size is 950 x 350 mm at first floor to support roof top car parking. At second floor, pillar size is 550 x 550 mm, primary beam size is 800 x 550 mm and secondary beam size is 800 x 250mm. The foundation is long pile of concrete. The structure has aged only 45 years and most of them have been inside, some pillars at north-east side have been outside but been covered with protection. From this condition and their sizes, it is possible to think that the structure is still healthy and have enough potential to accept more loads for extension.

In contrast, condition of facades are poor. Long glass wall along shops are totally covered with advertisements and display products, so the building looks turned its back to the town. This must be one of the reason why street Savilankatu in front of the building is always empty in spite of it is in the center of the town and near to town's active streets (Kauppakatu, Kuninkaankatu). The used materials look already dirty and exhausted. First of all, It looks that there must have been better material for the building which is right next to the Old Rauma.

The building has problem in interface to the town in spite of its strong structure inside. This is the reason why the site and building was chosen for the project.

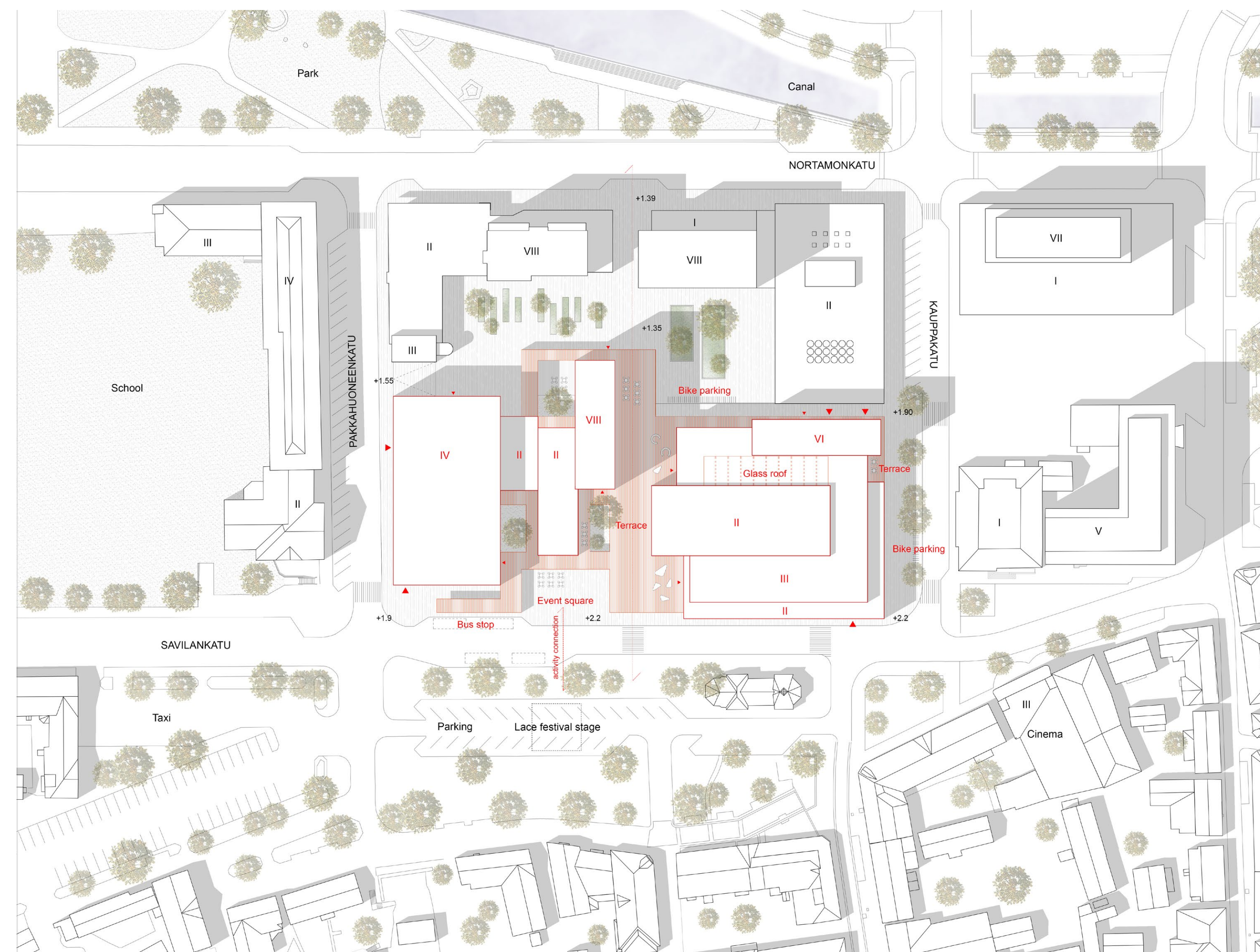
This project is designed with keeping the existing structure as much as possible for the aim of this thesis and project.



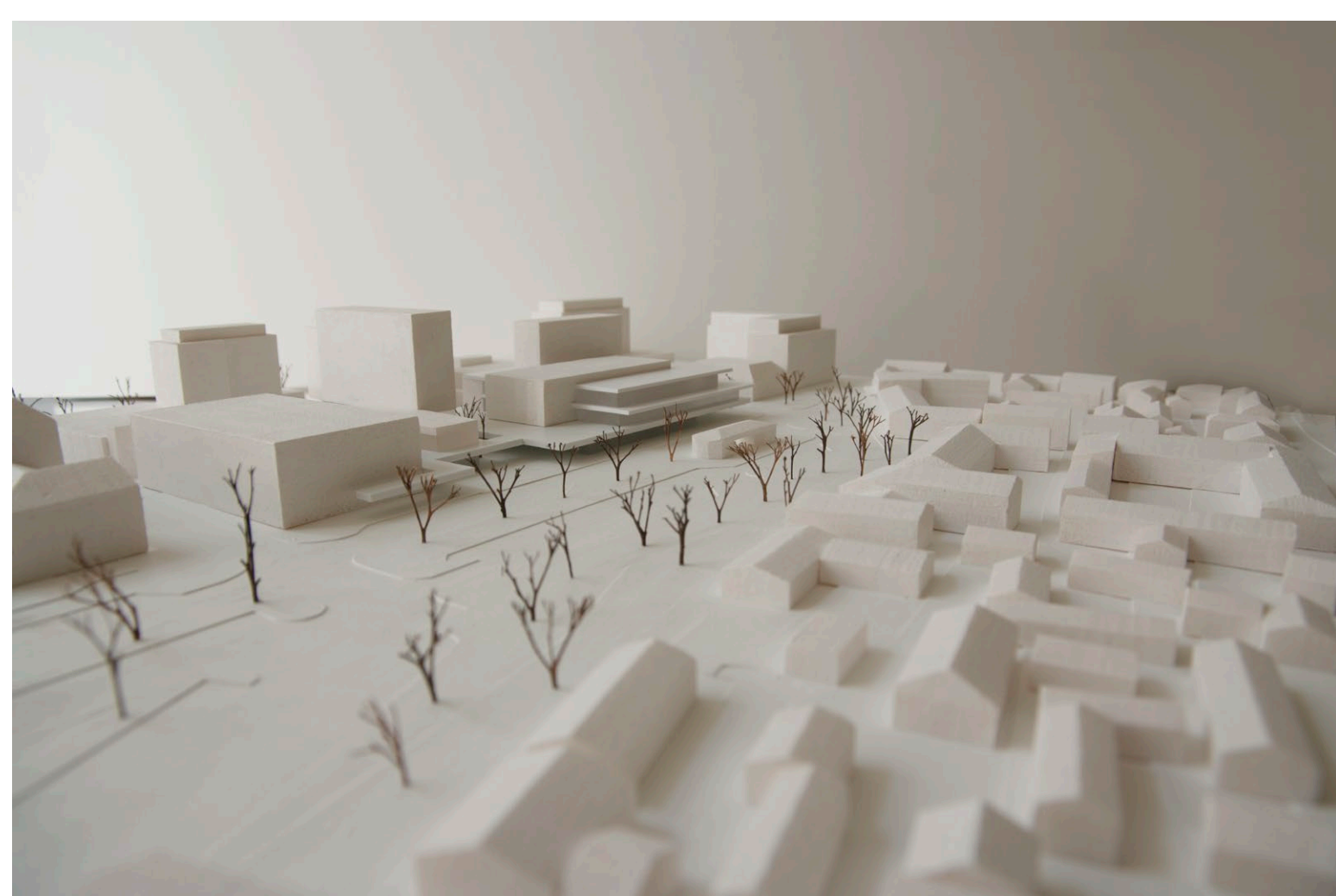
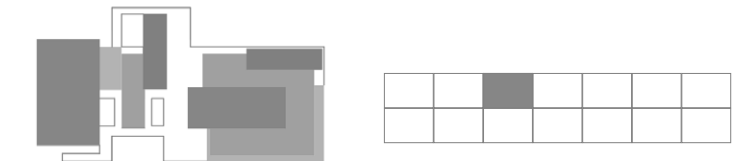
PERSPECTIVE FROM MARKET SQUARE



⌚ N SITE PLAN 1 : 2000



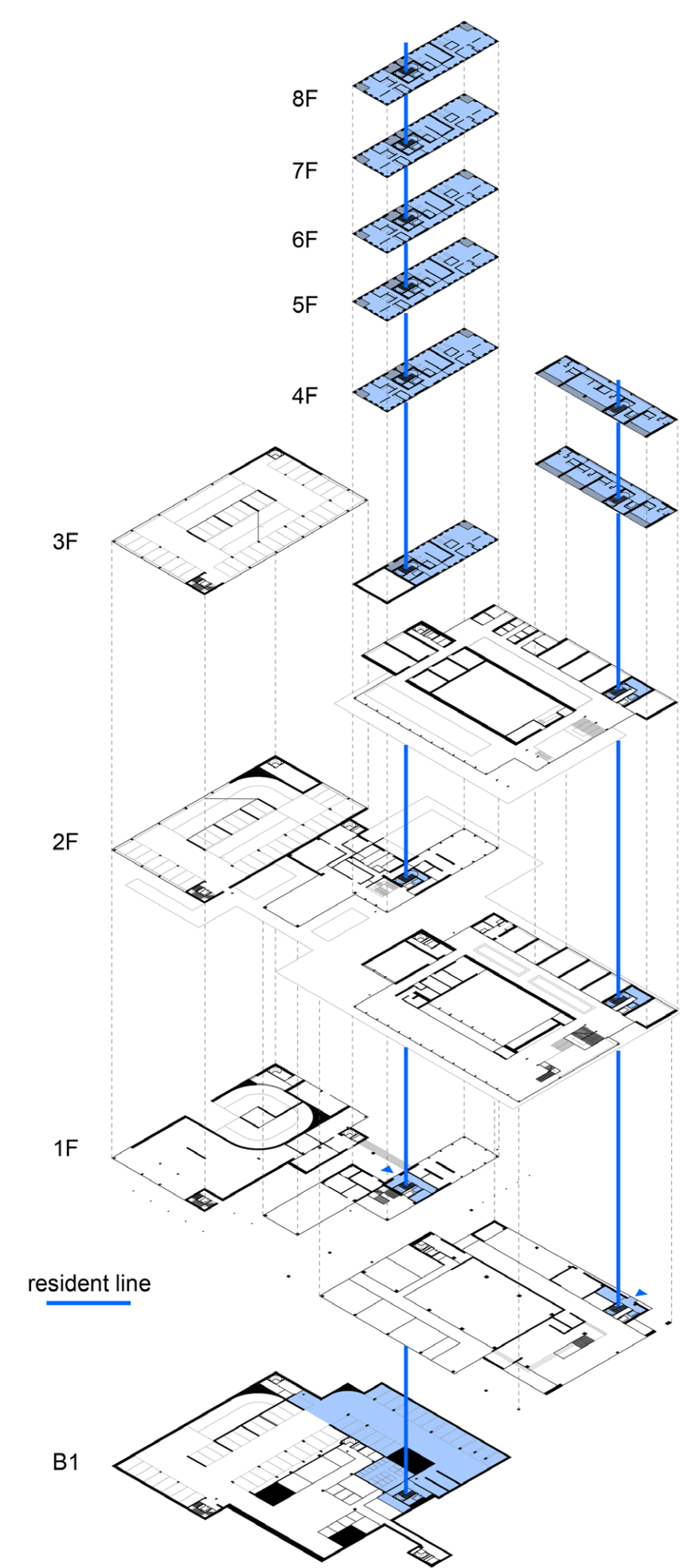
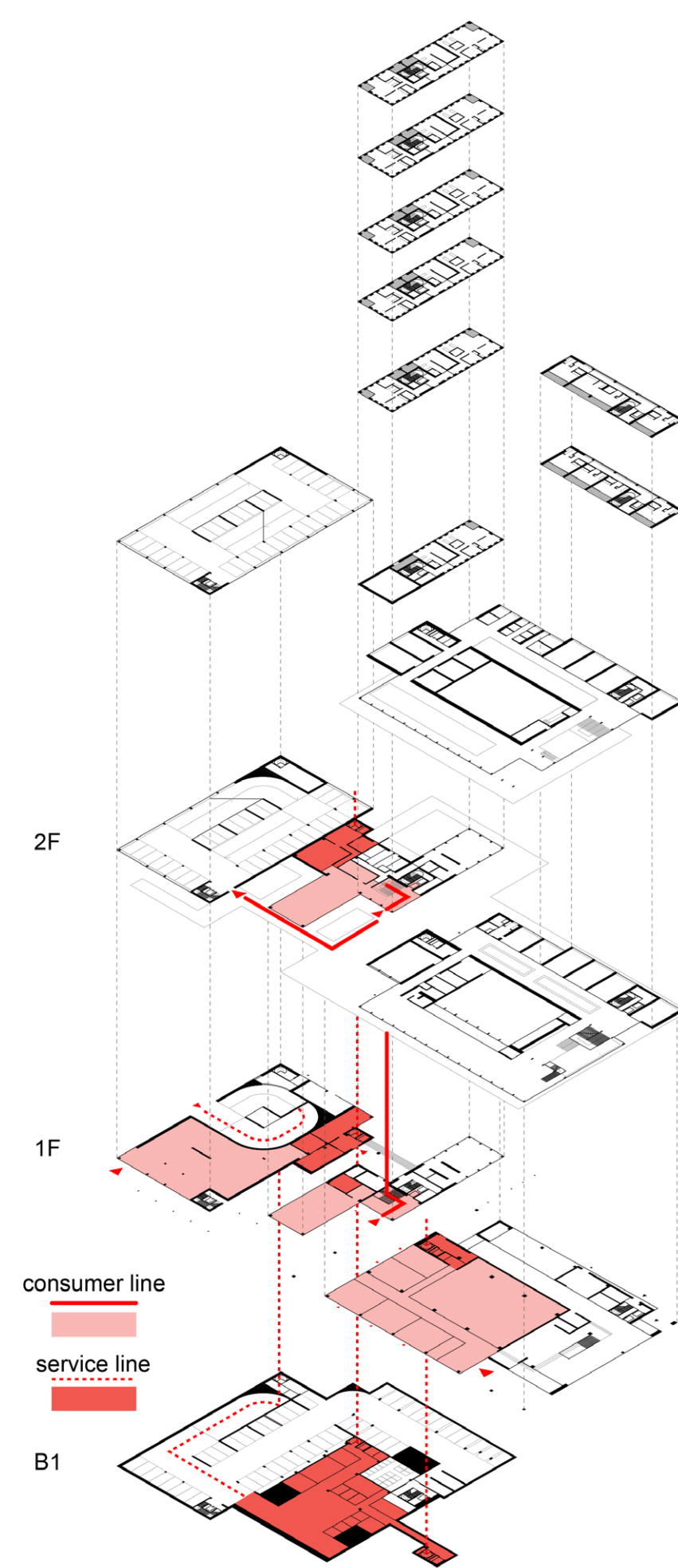
⌚ N SITE PLAN 1 : 800



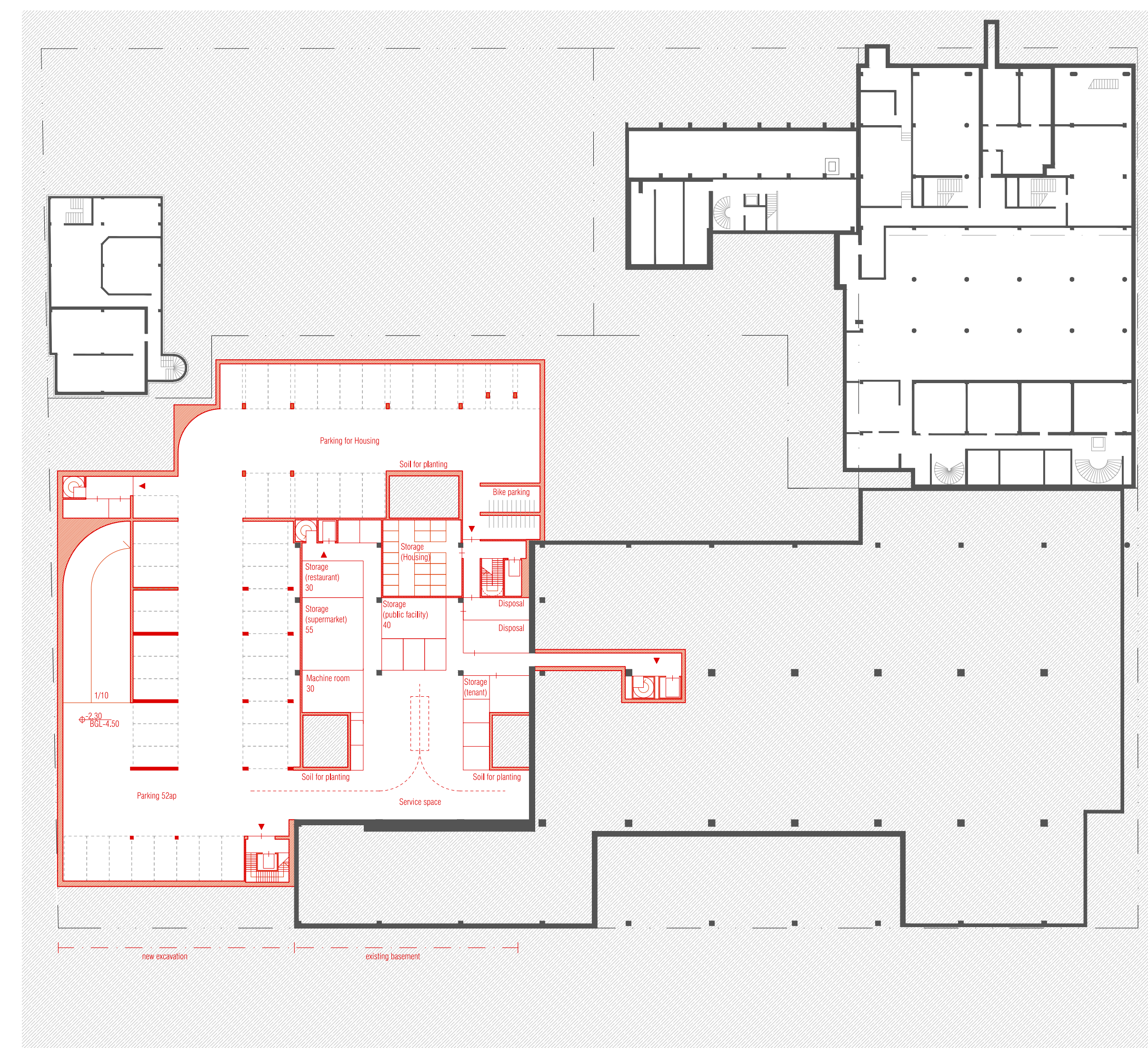
MODEL PHOTO

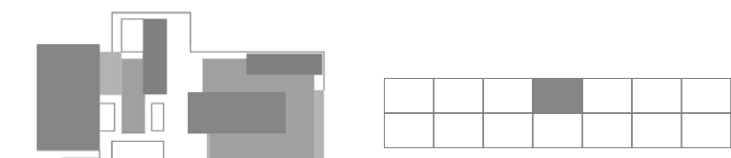


GOALS TO ACHIEVE



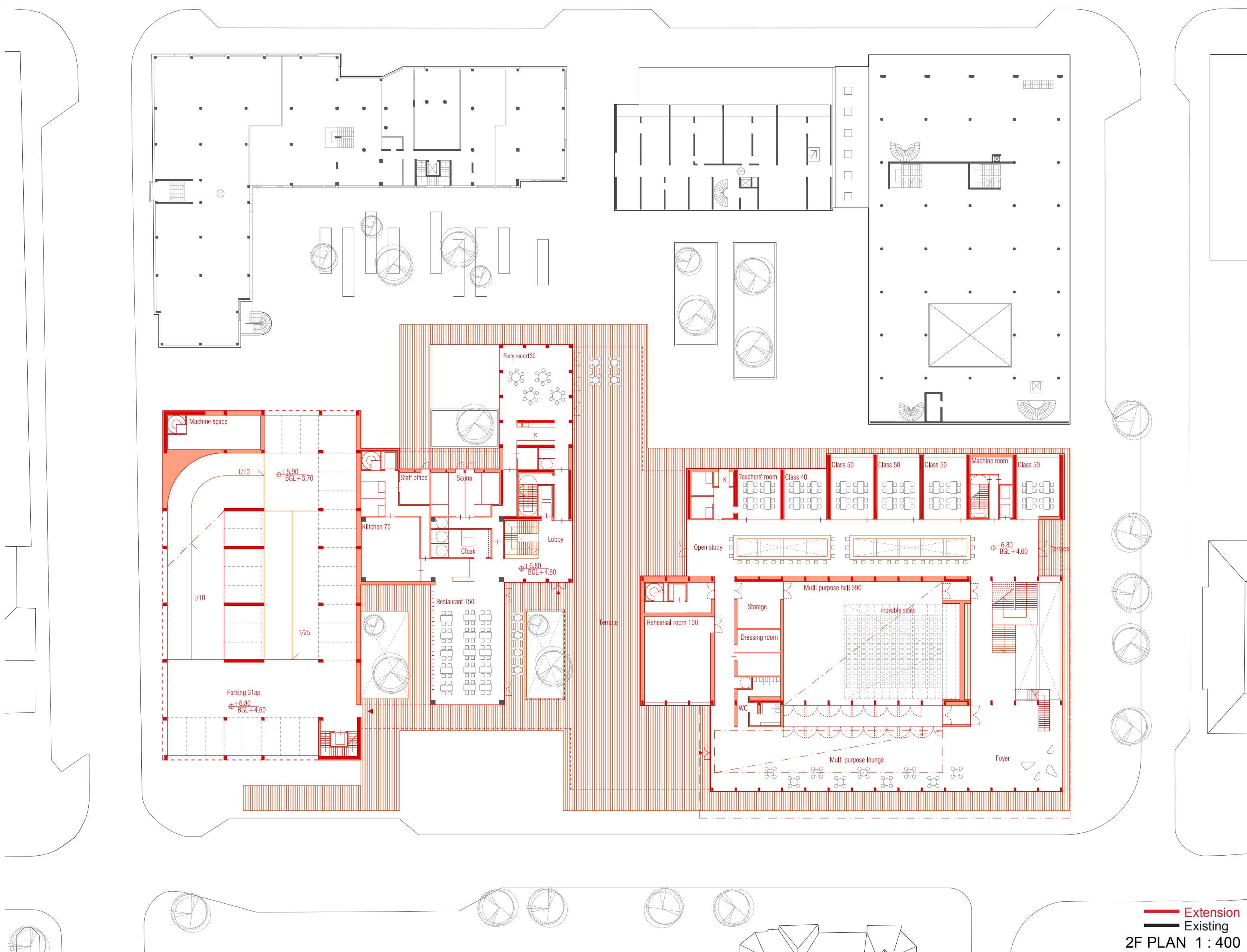
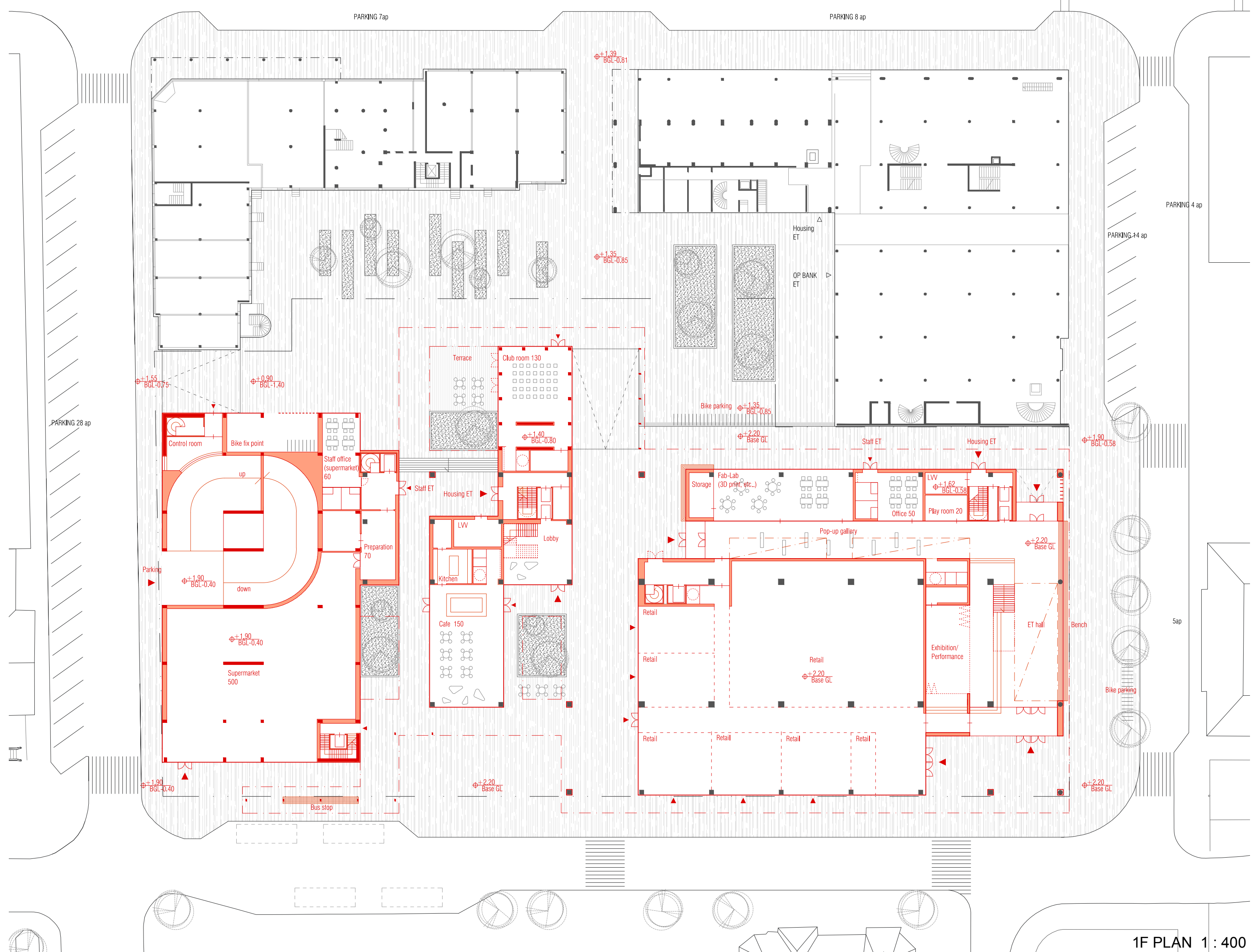
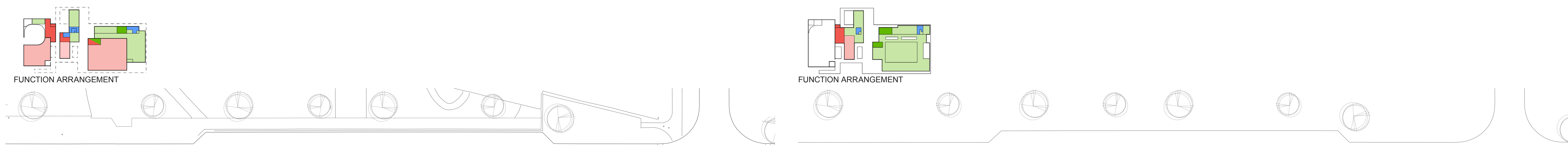
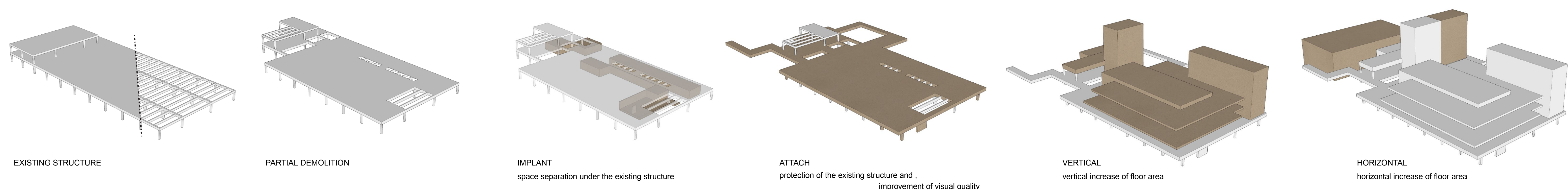
FUNCTION ARRANGEMENT



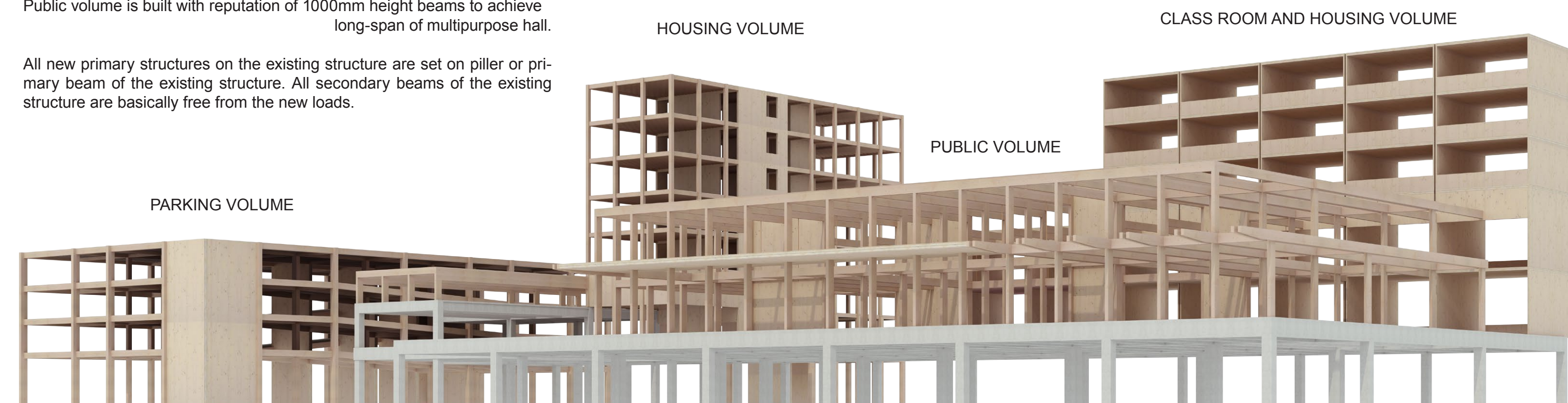


DESIGN PROCESS DIAGRAM

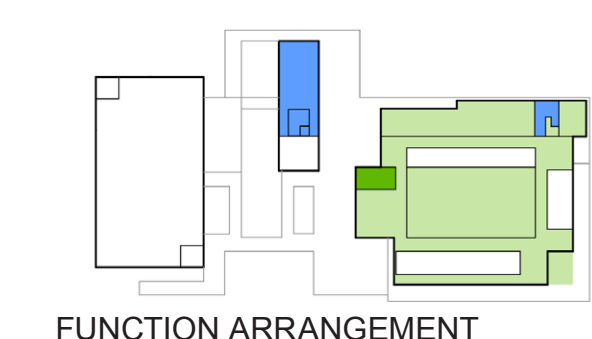
In thesis part, concepts of wooden extension were analyzed. The concepts were classified into four according to characteristics, those are Vertical, Horizontal, Implant and Attach. This project is designed by applying the four concepts to the existing structure.



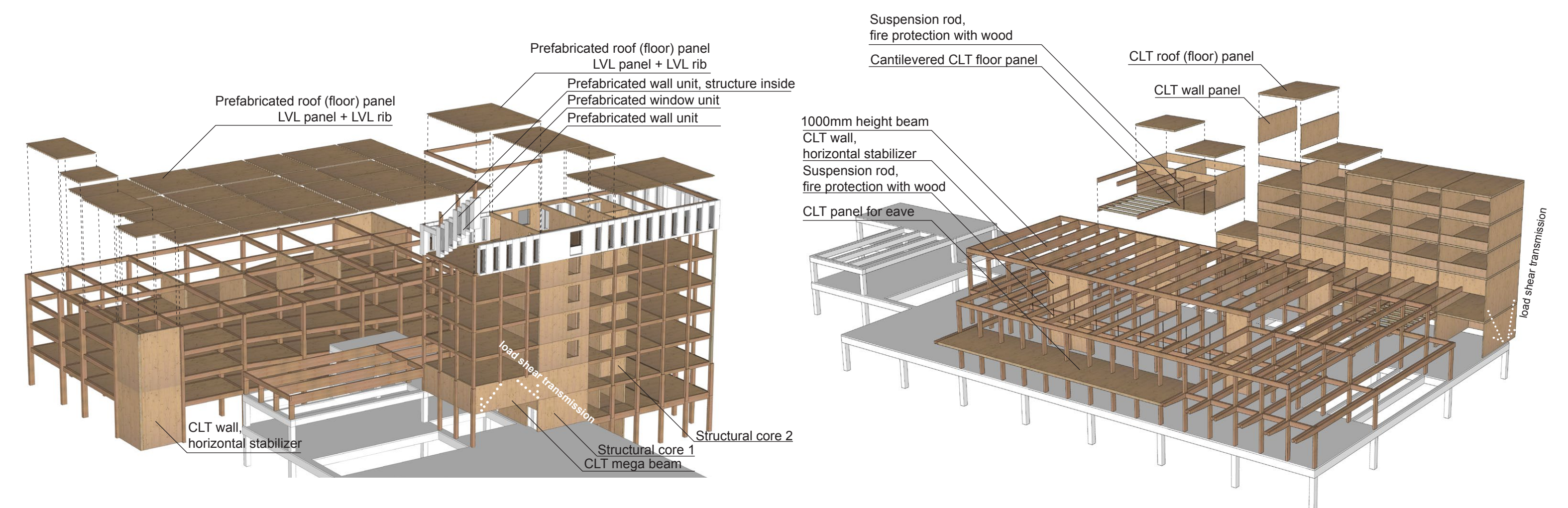
All new primary structures on the existing structure are set on pillar or primary beam of the existing structure. All secondary beams of the existing structure are basically free from the new loads.



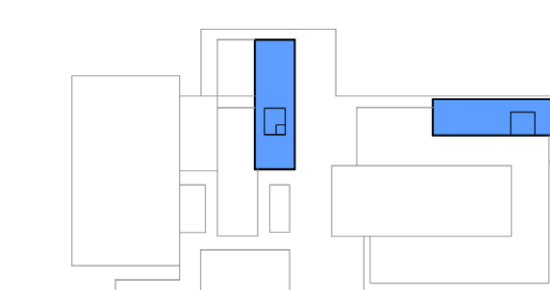
STRUCTURE PERSPECTIVE



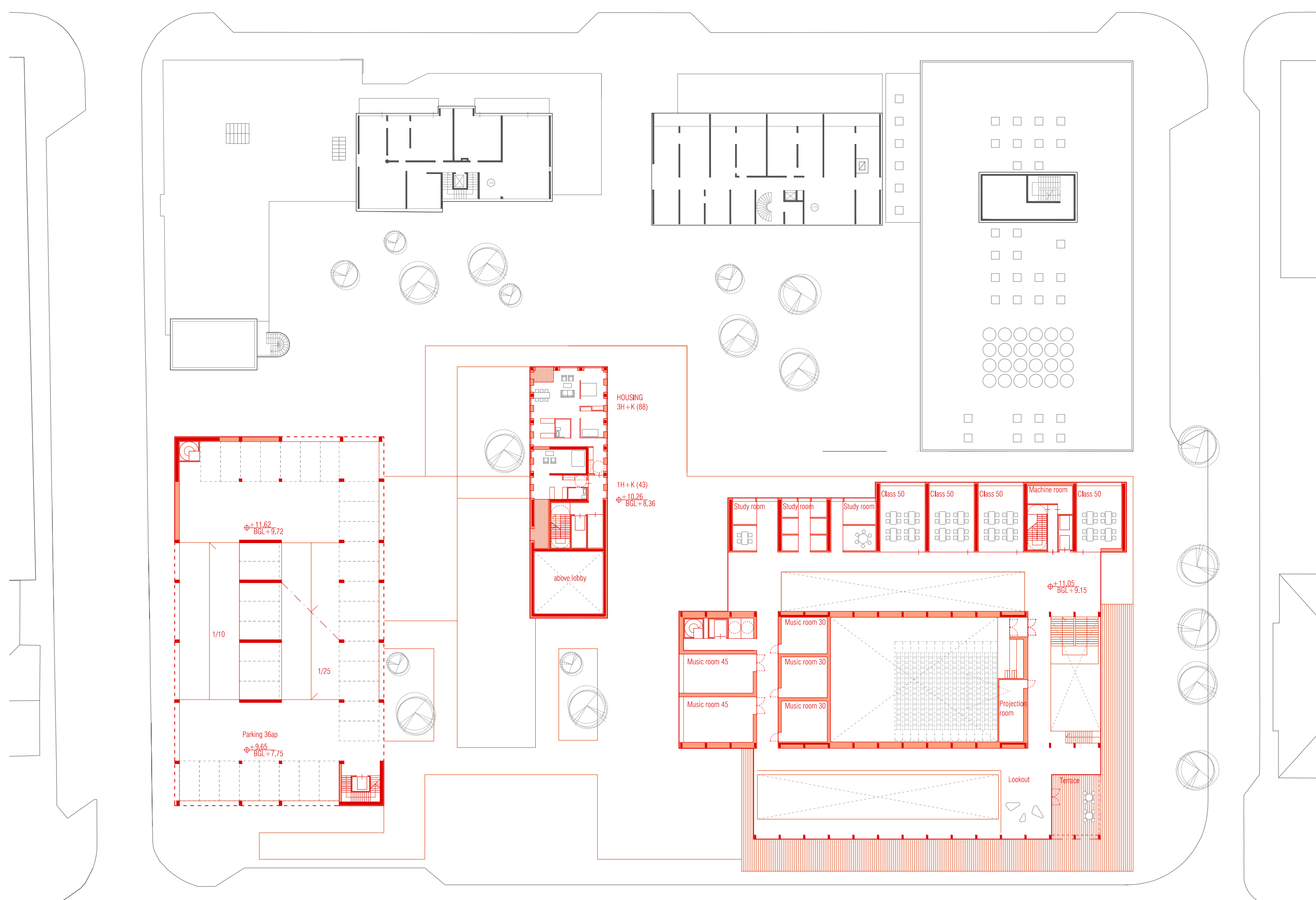
FUNCTION ARRANGEMENT



STRUCTURE DETAIL / Parking volume
Housing volume



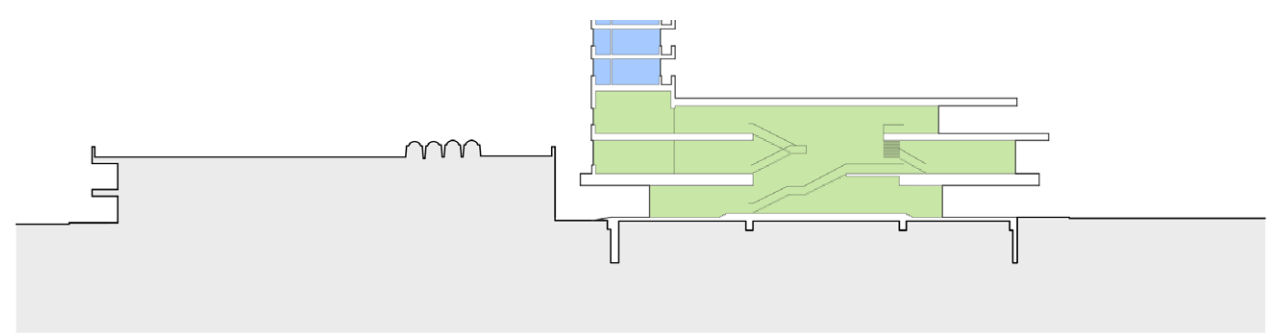
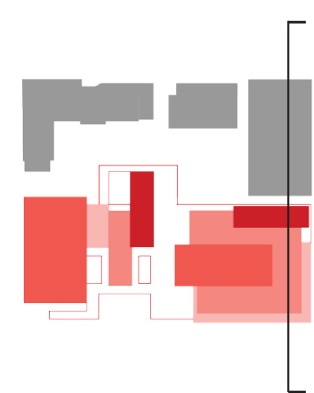
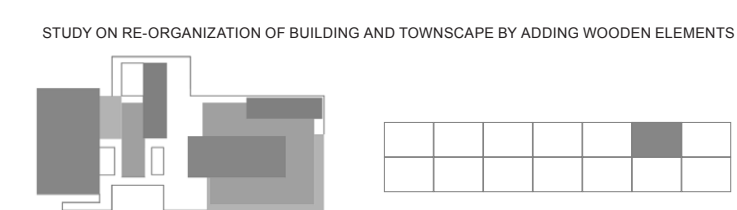
FUNCTION ARRANGEMENT



3F PLAN 1 : 400

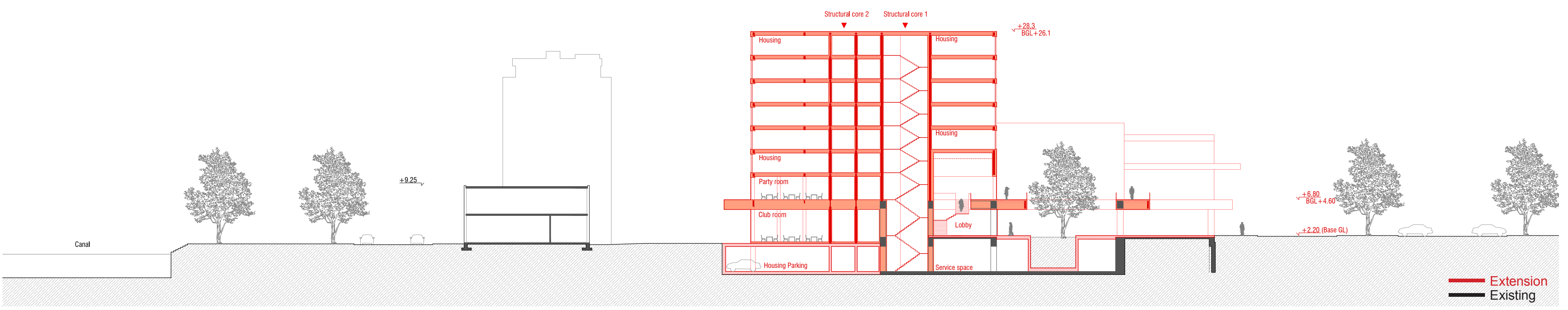
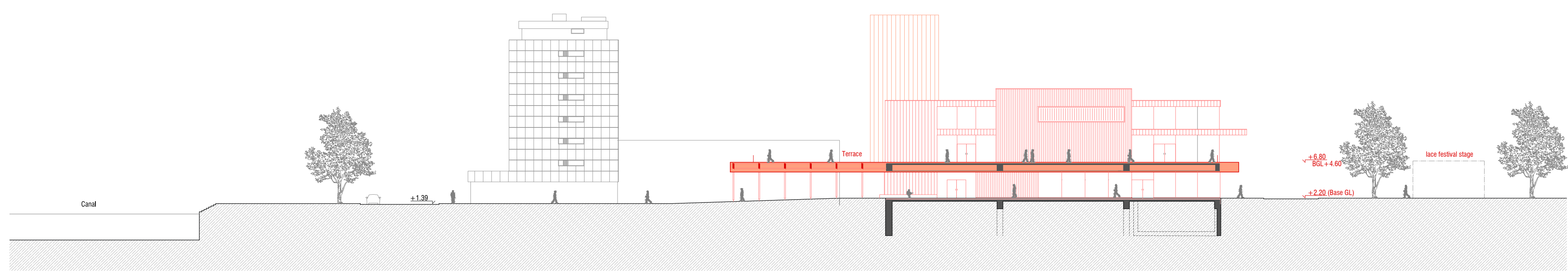
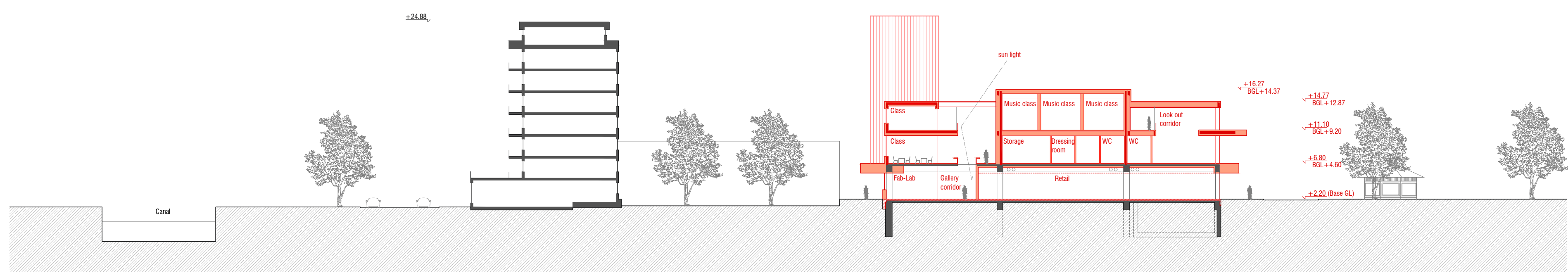
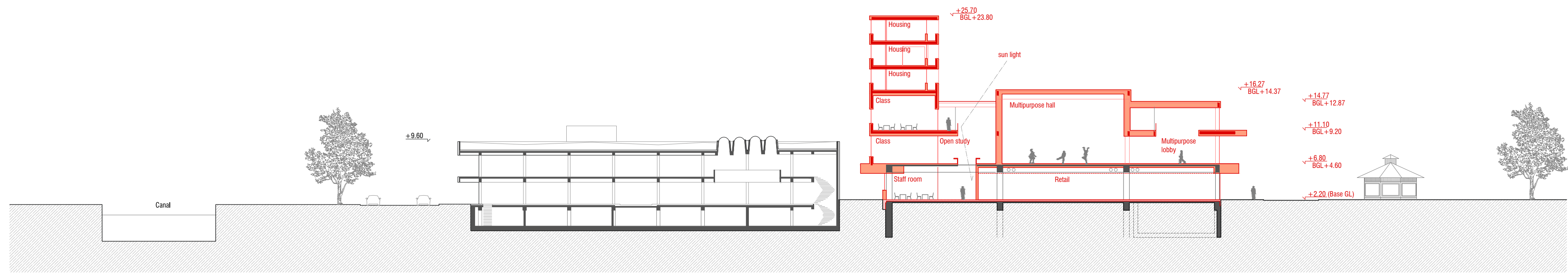
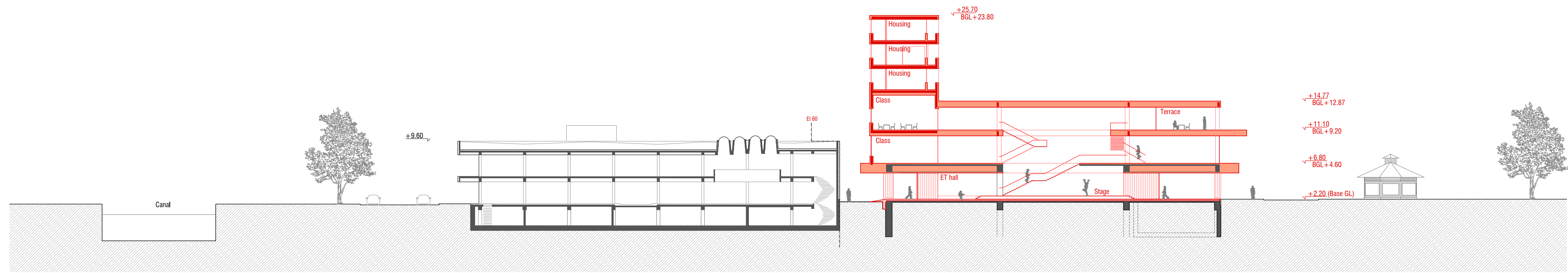
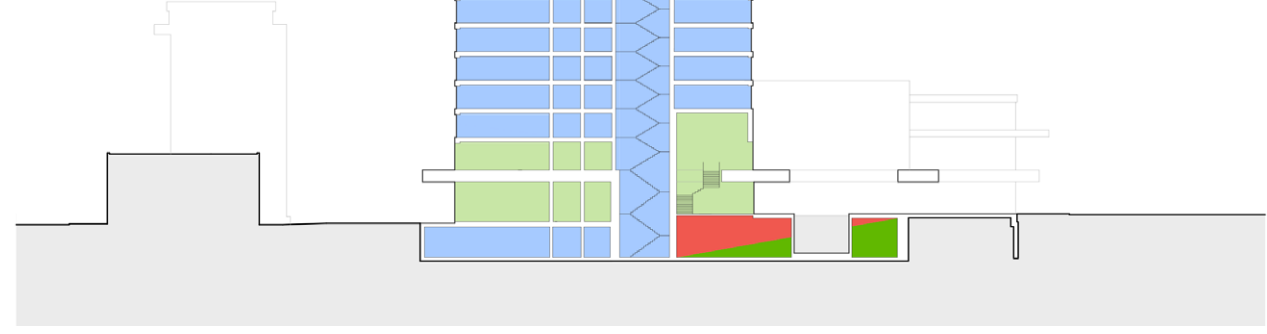
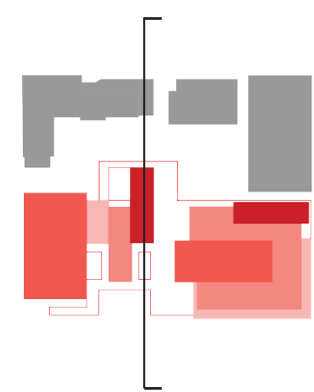
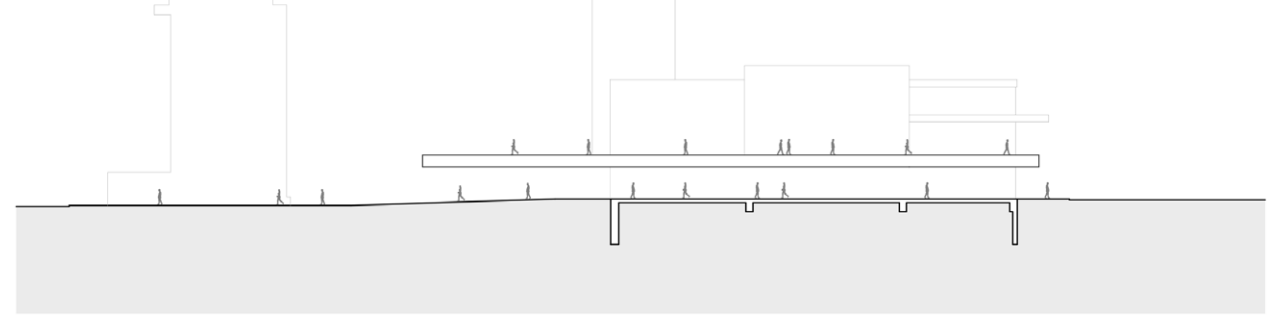
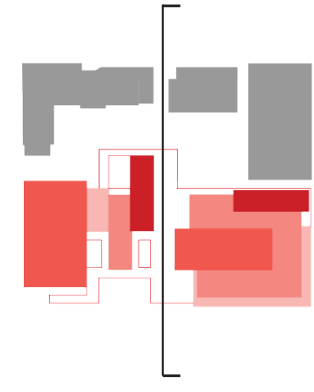
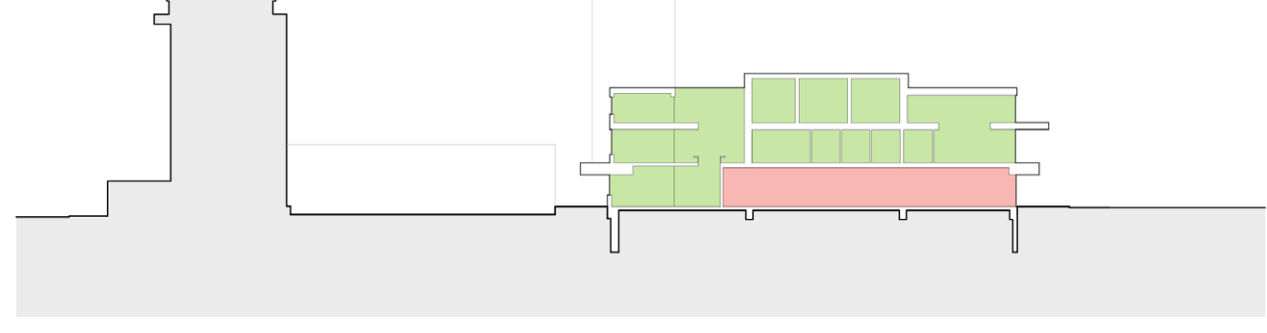
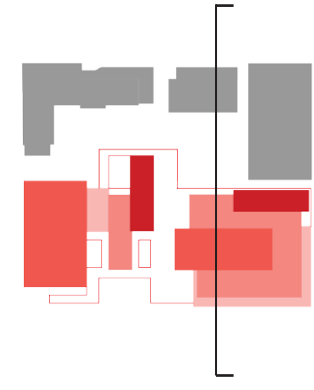
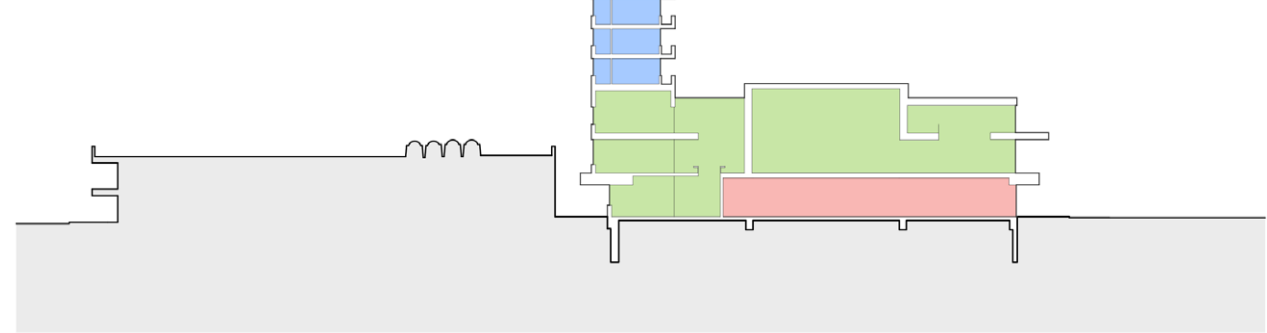
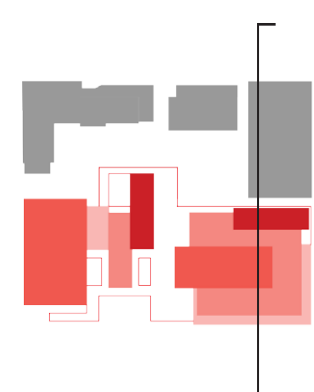


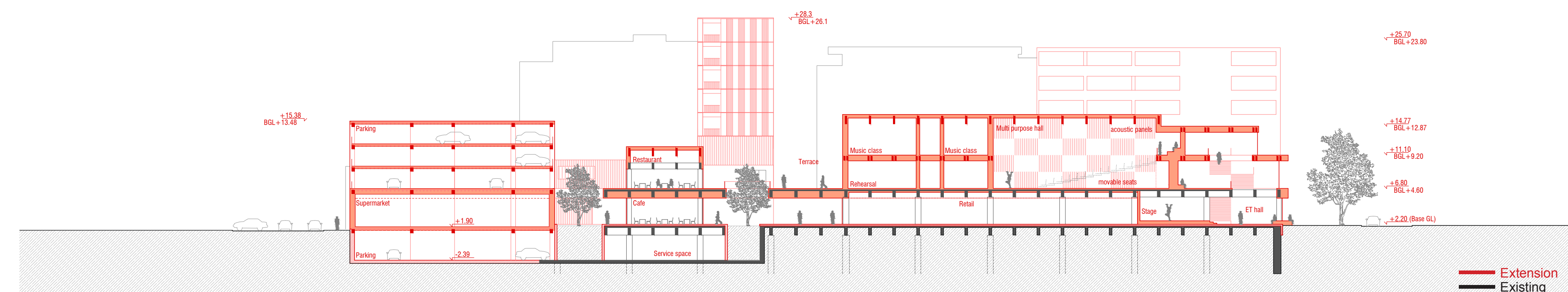
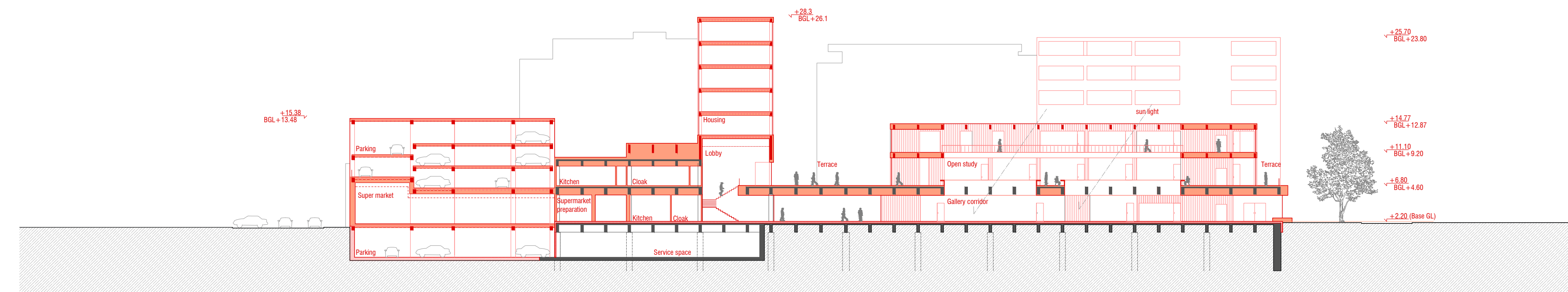
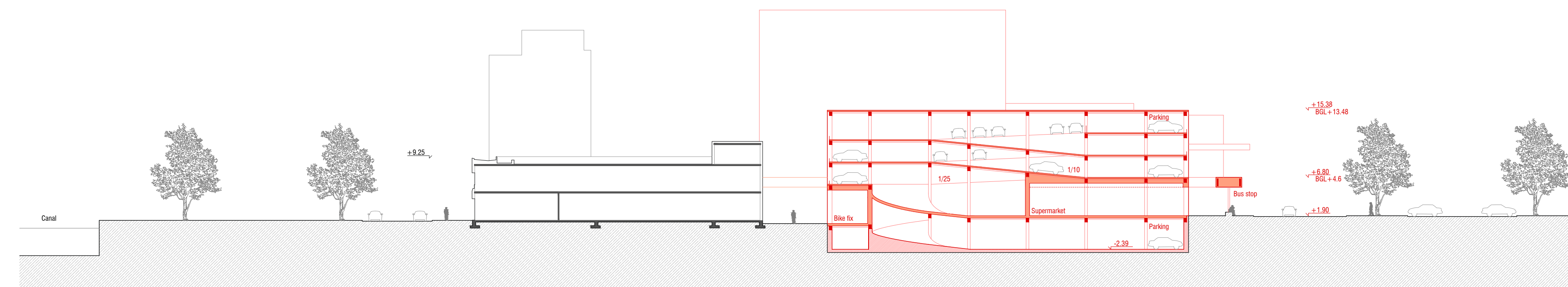
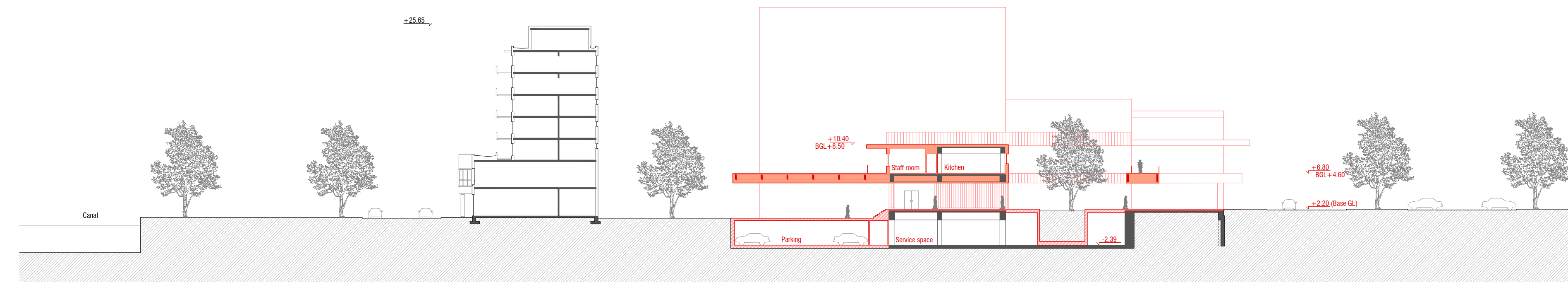
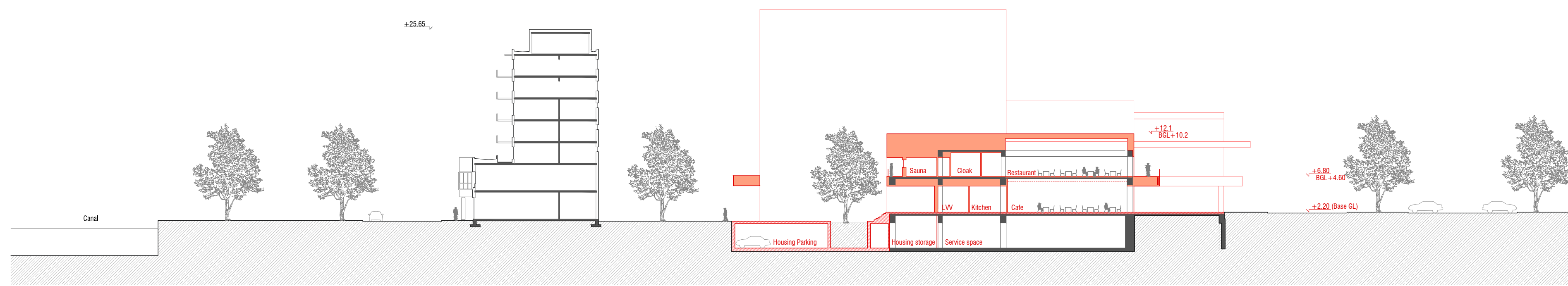
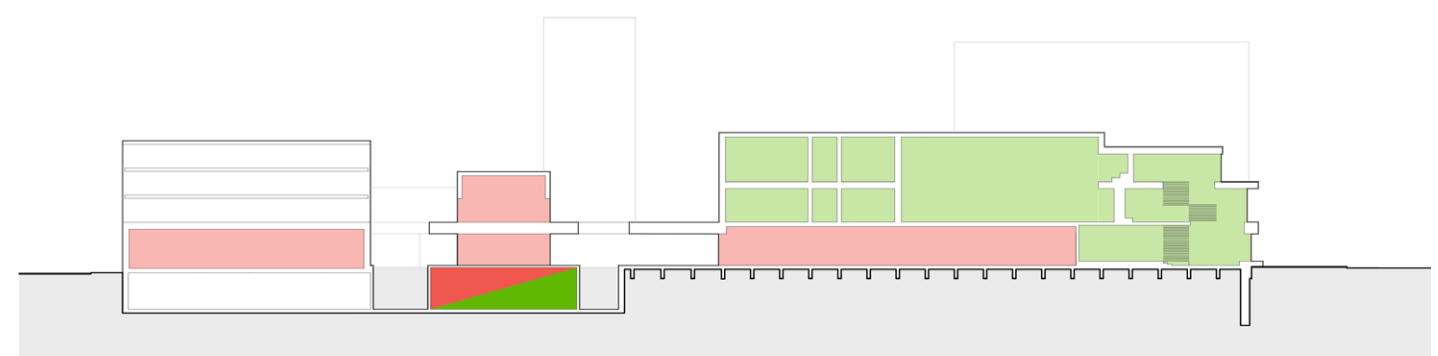
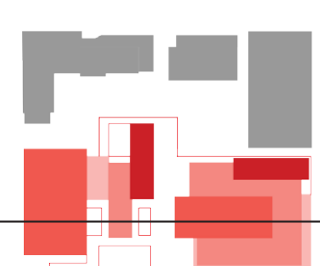
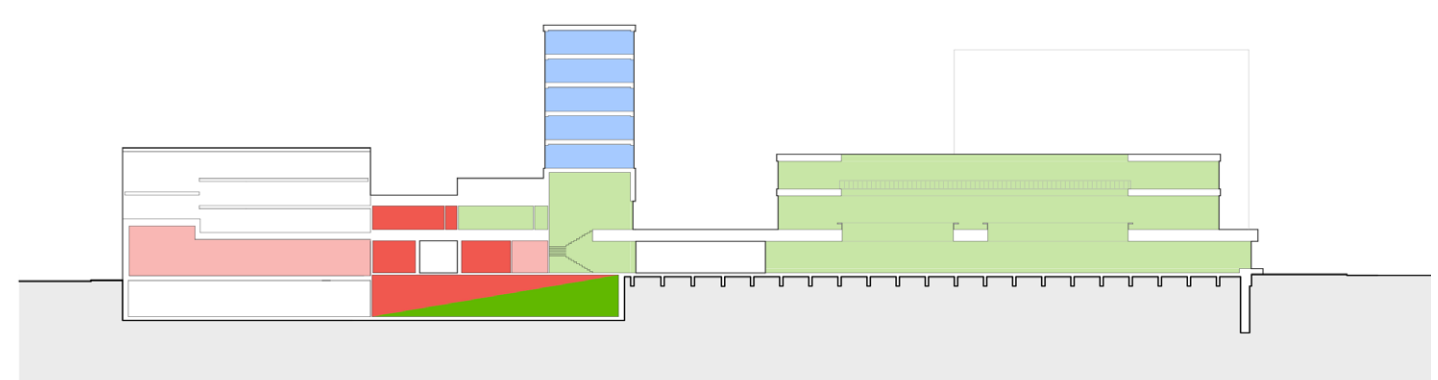
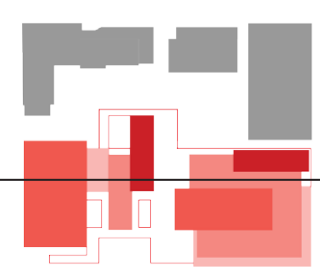
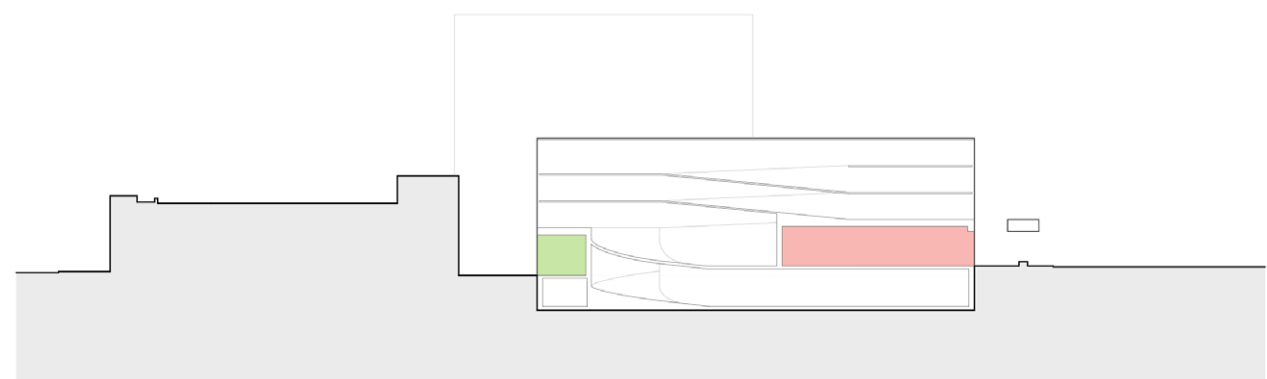
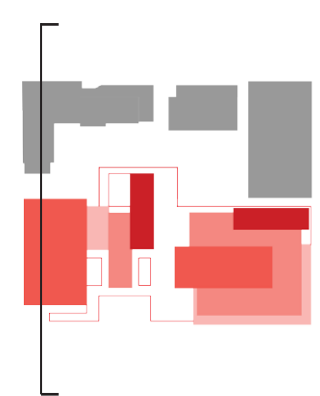
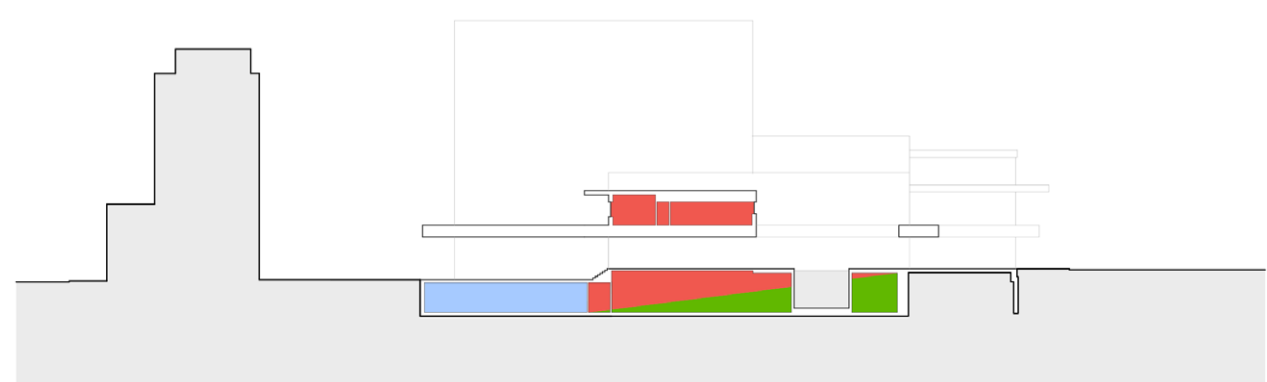
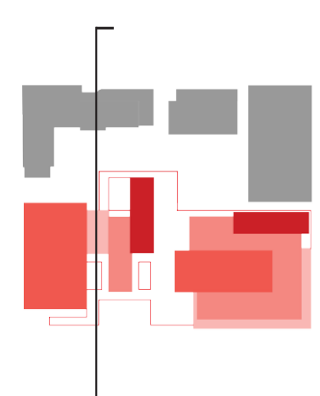
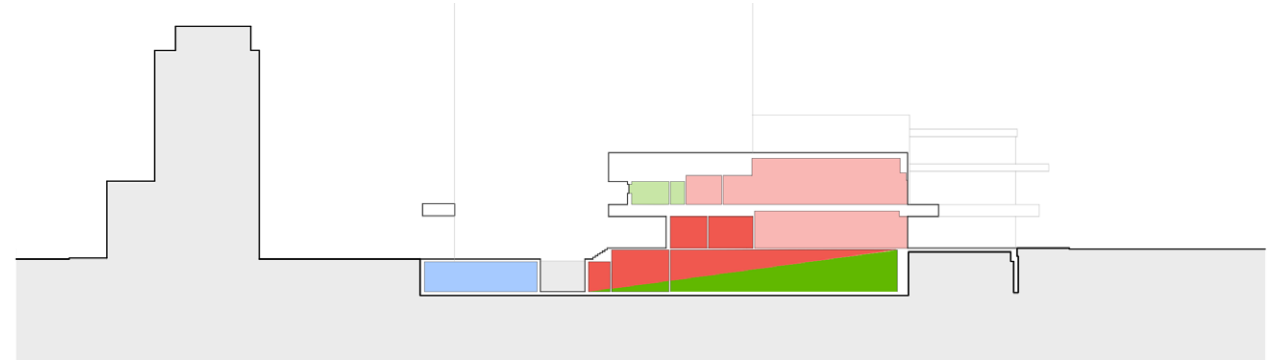
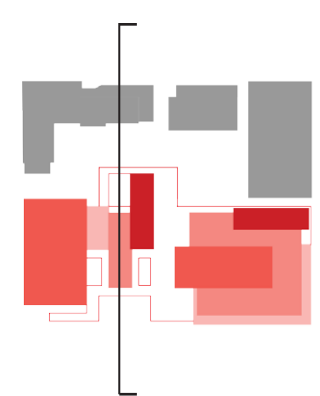
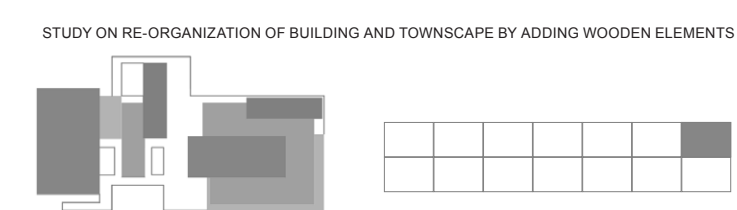
 Extension
 Existing
4-8F PLAN 1 : 400

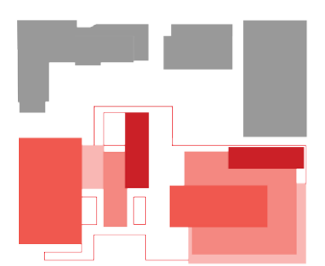
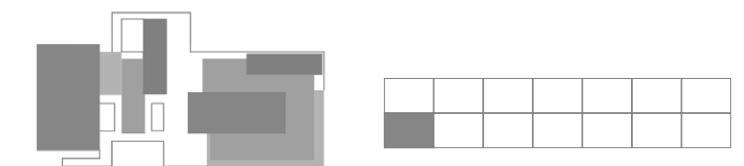


FUNCTION ARRANGEMENT

- commercial
- service space for commercial
- public, cultural
- service space for public, cultural
- housing



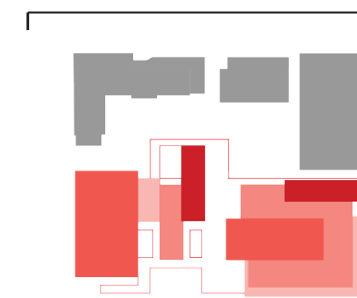
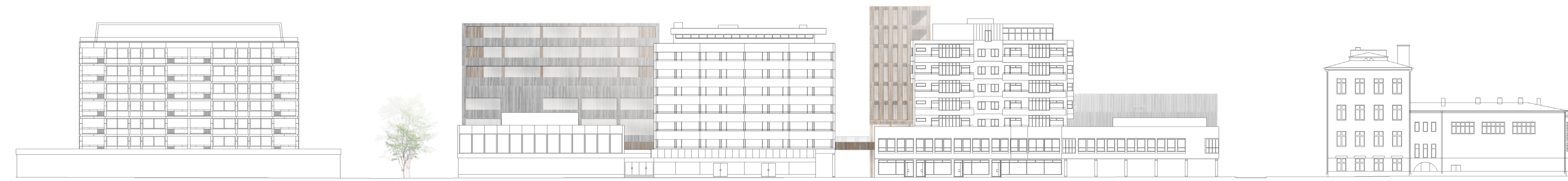
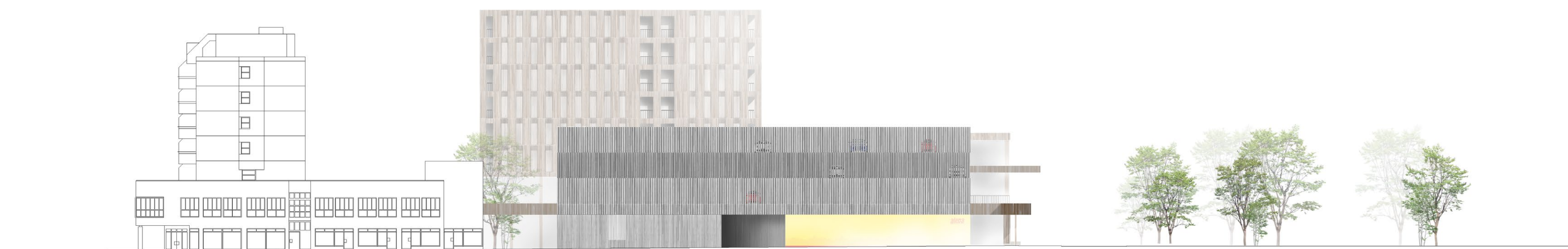
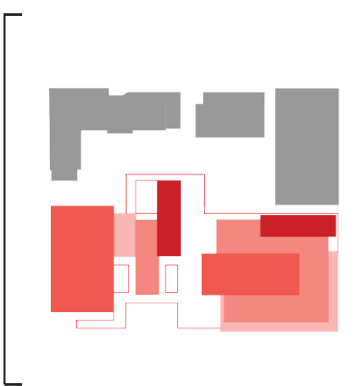
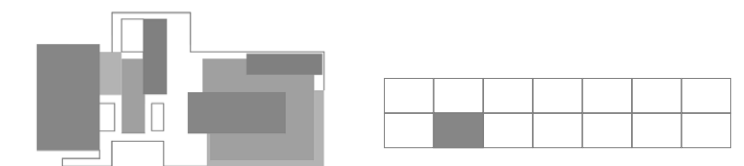




ELEVATION 1 : 400



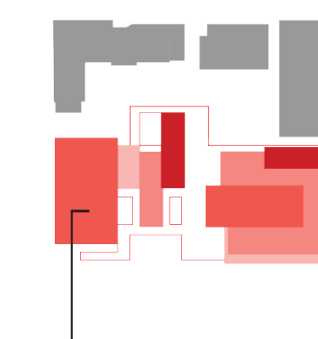
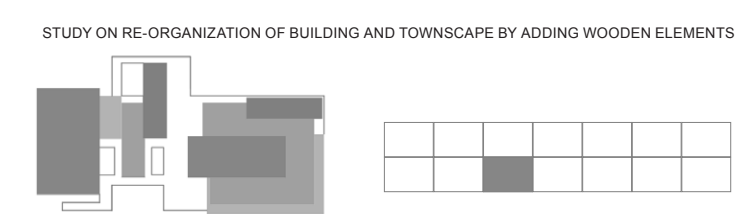
MULTIPURPOSE LOBBY PERSPECTIVE



ELEVATION 1 : 400



CLASS ROOMS AND OPEN STUDY SPACE PERSPECTIVE



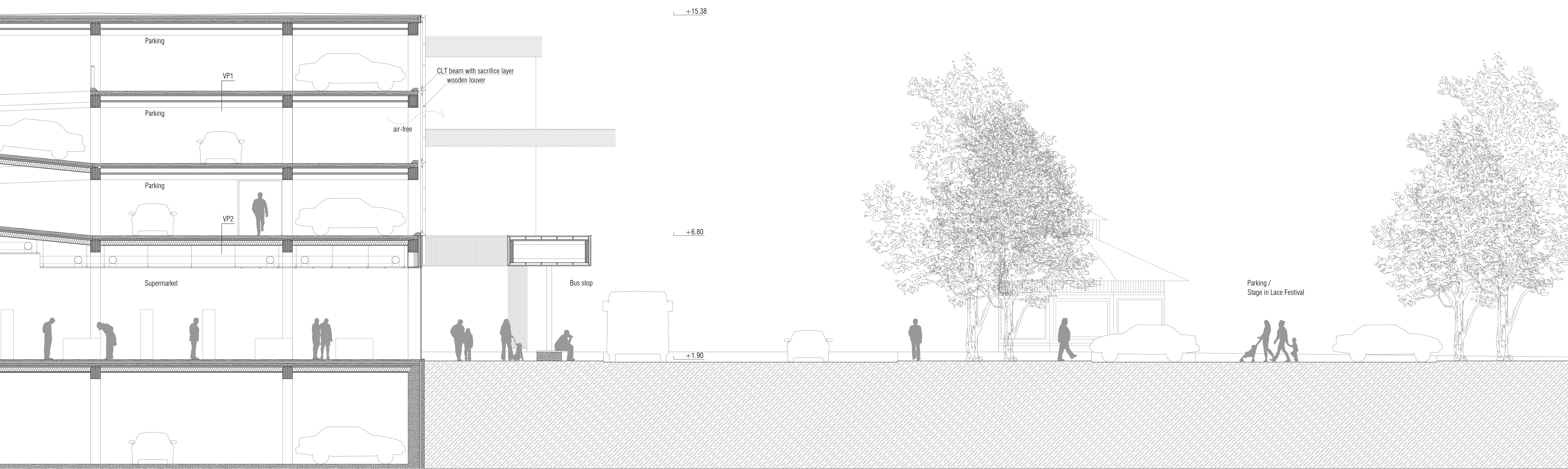
SECTION 1 : 75

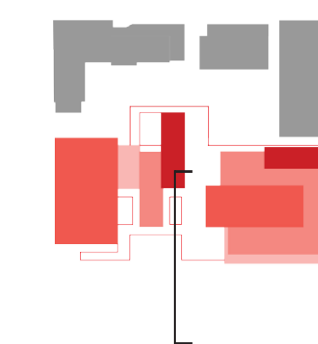
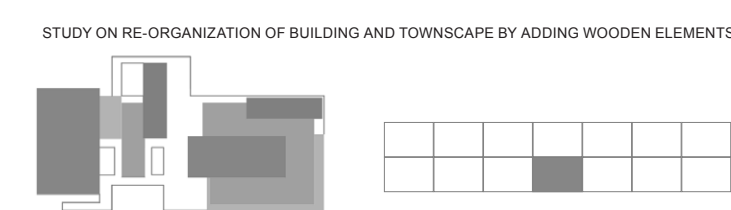
VP1

125 mm Screed
75 mm LVL panel
180 mm LVL rib
15 mm Gypsumboard
30 mm Furring
25 mm Wooden strip ceiling

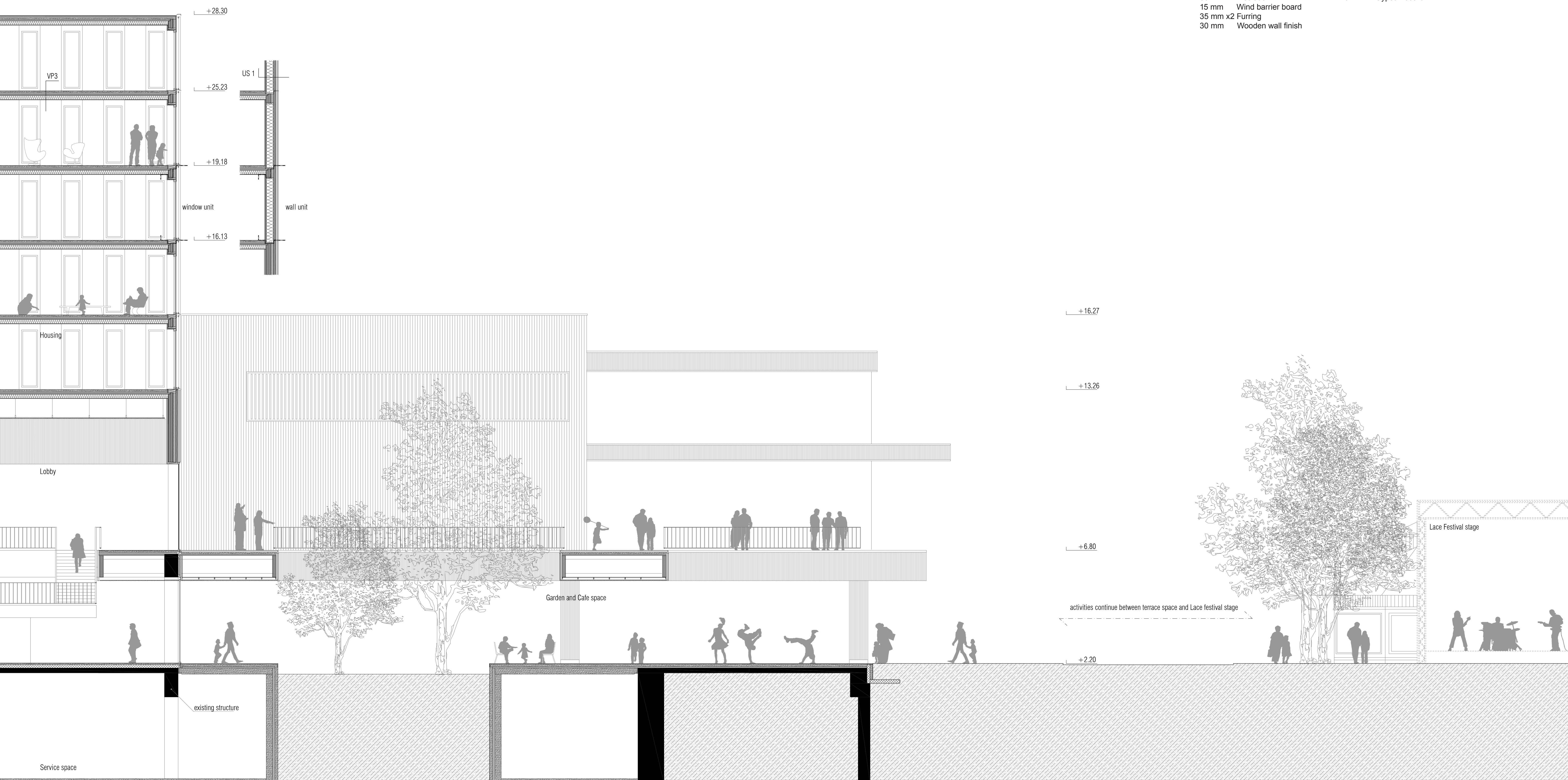
VP2

125 mm Screed
75 mm LVL panel
180 mm LVL rib
180 mm Insulation
15mm Gypsumboard
Pipe space
2mm Steel mesh ceiling





SECTION 1 : 75

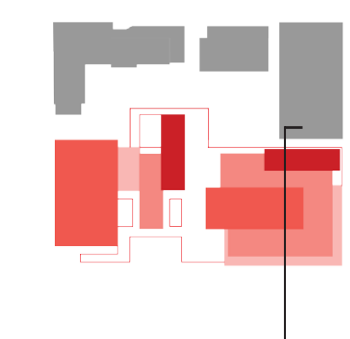
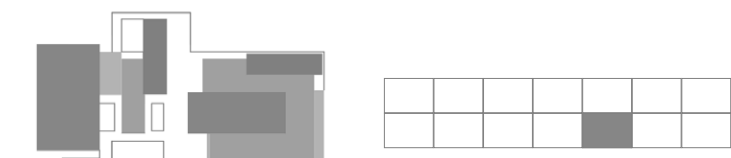


US1

20 mm Wooden wall finish
20 mm Furring
15 mm Gypsumboard
(200 mm CLT beam)
100 mm Insulation
15 mm Gypsumboard
60 mm Insulation
15 mm Wind barrier board
35 mm x2 Furring
30 mm Wooden wall finish

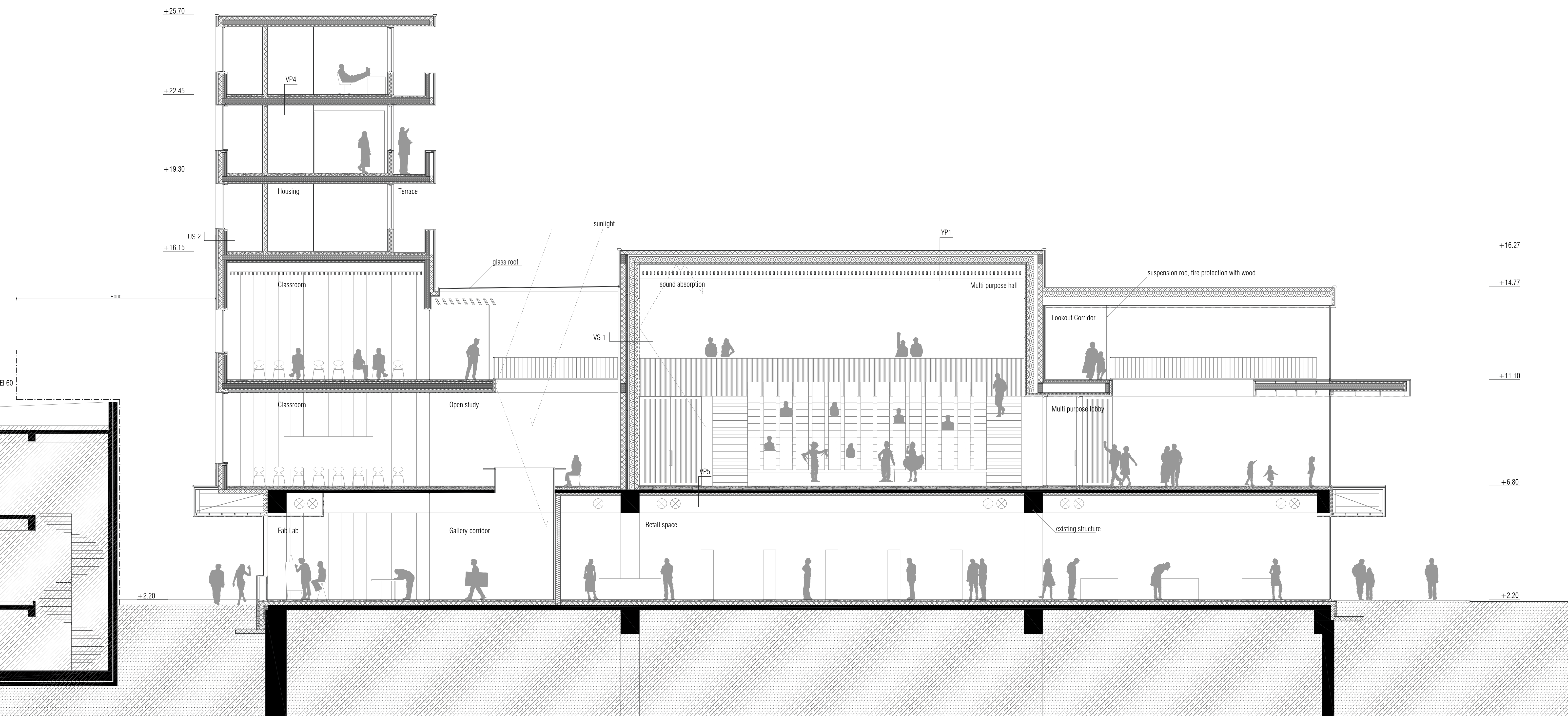
VP3

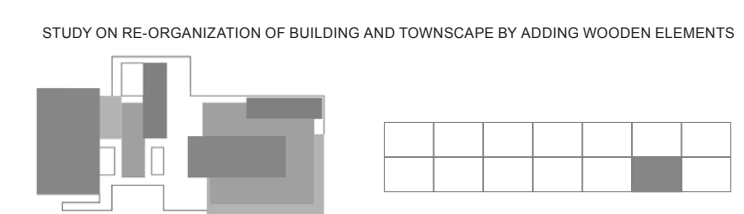
10 mm Wooden flooring
60 mm Screed
60 mm Insulation
60 mm LVL panel
160 mm LVL rib
160 mm Insulation
15 mm Gypsumboard



SECTION 1 : 75

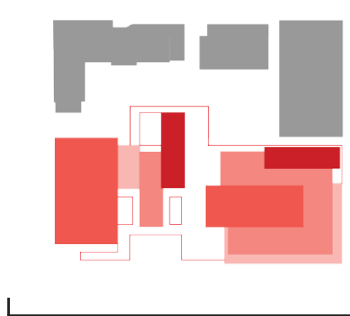
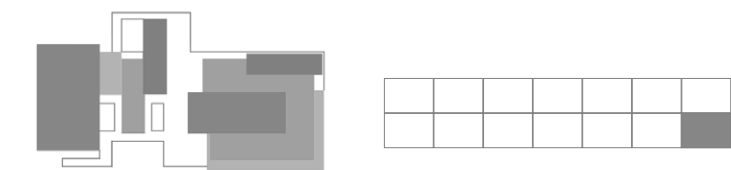
US2		VP4		VS1		YP1		VP5	
30 mm	Wooden wall finish	10 mm	Wooden flooring	30 mm	Wooden wall finish		Roofing	20 mm	Wooden flooring
30 mm x2	Furring	60 mm	Screed	30 mm	Furring	20mm	Plywood	60 mm	Screed
15 mm	Wind barrier board	75 mm	Insulation	15 mm x2	Gypsumboard	30mm	Batten	15 mm	LVL panel
140 mm	Insulation	200 mm	CLT	200 mm	Insulation		Water proof layer	60mm	Isolation space
150 mm	CLT	50 mm	Insulation	100 mm	Prefabricated panel filled with sand	20 mm	Plywood		filled with cellulose
15 mm x2	Gypsumboard	15mm x2	Gypsumboard	250mm	Air space filled with cellulose	130 mm	Insulation	130mm	Existing structure slab
20 mm	Furring			100 mm	Insulation with batten	220 mm	Air space filled with cellulose	100mm	Insulation
20 mm	Wooden wall finish			50mm	Insulation with counter batten	100 mm	Insulation with button	15mm	Wooden boarding
				50mm	Wooden acoustic panel	50mm	Insulation with counter batten		
						20mm	Wooden boarding		
							Space		
						120 mm	Wooden louver		





1. Larch vertical boarding,
transparent oil stain finish
2. Silver fir vertical boarding,
transparent oil finish
3. Silver fir vertical louver,
diagonally attached,
translucent black paint finish
4. Silver fir, prefabricated wall element,
transparent oil finish
5. Silver fir, prefabricated window element
transparent oil finish
6. Silver fir vertical boarding,
translucent black paint finish





ELEVATION 1 : 75



Author Satoshi OHTAKI		
Title of thesis Study on re-organization of building and townscape by adding wooden elements		
Department Department of Architecture		
Professorship Building Design		Code of professorship A-112
Thesis supervisor Professor Pekka Heikkinen		
Thesis advisor(s) / Thesis examiner(s) Professor Hannu Hirsi, Samuli Miettinen, Henri Raitio		
Presentation board (pcs) 14		Models (pcs) 1
Year 2015	Number of pages (report + annexes) 91	Language English

Abstract

This Master's thesis is a study about how to re-organize and to improve existing building and townscape or cityscape by way of adding wooden elements. Wood as architectural construction material has three outstanding characteristics, its light weight in comparison of strength, its thermal capacity and its variety in structural form. These characteristics indicate superiority of wooden construction in extension construction. Because, wooden construction can be built on existing structure more easily for its light weight, can be built on existing structure without cold bridge for its thermal capacity, can be built on existing structure in any structural form according to existing structure for its variety in structural form. In today's situation that cities are already full of existing buildings, to find better solution, greener and more effective solution for re-organizing existing building and cityscape to fit to new needs of city is inevitable. This Master's thesis is a case study to find such solution in way of adding wooden elements.

In the second part of the thesis, concepts of wooden extension were analyzed. The concepts were classified into four according to characteristics, those are Vertical, Horizontal, Implant and Attach. Each concept was analyzed individually with examples, and applied to the design in the fifth part of the thesis according to the analysis.

The site for the design was chosen in Rauma which is 250km north from Helsinki. Rauma has two different areas in town, the one is Old Rauma which is the area of remained old wooden buildings registered in UNESCO World Heritage in 1991, and the other is the area built with newer way. The site is on the border of the two, in newer side. In the third part of the thesis, analysis of the area and the existing building in the site was done. First, the analysis revealed that the site which is at the border of old and new area of the town is, at the same time, border of "organic and straight scape", "small and big building scale", "wood and concrete building material", "commercial and cultural city function" and "border of two green spaces". The goal of design was set to connect and buffer these differences. Secondly, the functional analysis revealed required program for the thesis site. Town planning office expected keeping existing commercial and parking function, and wished new housing and middle-scale hall for events. Music school and adult education center nearby the site has been in shortage of class rooms. As a result it was decided to design building as hybrid building of commercial, public, educational, housing and parking.

In the fifth part, in design study part, some separated wooden volumes were added to the existing structure with four extension concepts studied in the part two of the thesis, after partial demolition of existing concrete structure. The separation of volume was to connect different scale of old and new area of the town and to create spaces for walking and planting. Those separated volumes were integrated by terrace, canopy and eaves set at some levels. These eaves and the spaces under eaves work also for communication between new building and its surrounding. Different structural systems were applied for each volume to achieve different program inside. The parking volume was built with massive post and beam structure, the housing volume was built with post and beam around CLT structural cores with prefabricated wall elements, the volume for the class room and another housing was built with assembling CLT wall and slab panels, and the volume for public function was built under repetition of 1000mm height beam to realize long span of the hall space.

Keywords wood construction, extension, renovation, townscape, cityscape